CASE STUDY - Sewing	
TASK TITLE: Sewing	
Task Description:	Sewing involves the use of a sewing machine to join two or more pieces of fabric. Typically the tasks are performed on a single needle machine by a seated employee. Typical jobs in which sewing is performed include (not necessarily limited to): • survival equipment • life support • museum/exhibit production.
Job Performance Measures Most Often Impacted by Sewing:	Quality of product, time taken to completion.
Typical Employee Comments about Sewing:	There appears to be a significant difference in symptoms or complaints of fatigue and soreness between high and low volume sewing jobs. Fatigue and discomfort complaints also increase as the fabric or material thickness increases and/or the workability decreases. For employees who do report symptoms, the primary body parts affected are the shoulder/neck (one shoulder usually worse than the other), hands/wrist/arm, and lower back. The secondary body parts affected are the legs/feet due to constant use of foot pedals.
Suggested Level II Analysis:	Postural Analysis, Elemental Task Analysis, Light Measurement

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
1. Reaching	• Work surface is too high	32. Lower the work piece/work surface • adjust current work surface	✓		low	med	med
		79. Provide a work surface which is adjustable in height		✓	high	med	med
		120. Raise the chair	✓		low	med	med
2. Arm forces: Repeated contraction of the muscles of the arm or holding/carry-ing materials	• Rarely occurs	N/A					
3. High speed, sudden shoulder movements	• The practice of manually ripping a seam during disassembly or rework	13. Encourage ergonomic work techniques • work procedure training	✓		low	med	med
		• pre-cut thread at regular intervals across seam	✓		low	med	med
		• rip the seam in small sections; avoid ripping in one motion	✓		low	med	med

Shoulder/Neck (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
4. Head/neck bent or twisted	• Work surface is too low	124. Raise the work piece/work surface • adjust current work surface	✓		low	med	med
		28. Lower the chair	✓		low	med	med
		87. Provide an appropriate chair/stool		✓	med	med	med
	• Light levels are too low	22. Increase light levels • repair/replace bulb on existing task light	✓		low	med	med
		• reposition task light to prevent glare or bright spot on the needle plate	✓		low	med	med
		• provide a task light with variable intensity		✓	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	• The work surface is flat	136. Rotate the work piece • adjust the work surface • angle work surface toward operator	 ✓ ✓		 low low	 med med	 med med
	• The chair is too low	120. Raise the chair	✓		low	med	med
		87. Provide an appropriate chair/stool		✓	med	med	med
	• The work surface is too high	32. Lower the work piece/work surface • adjust current work surface	✓		low	med	med
		79. Provide a work surface which is adjustable in height		✓	high	med	high
6. Repeated manipulations with fingers	• Rarely occurs	N/A					
7. Hyper-extension of finger/thumb or repeated single finger activation	• Use of manual scissors for cutting and trimming thread increase stress to the wrists	66. Provide a power tool • automatic cutter that should be activated by “healing” the foot pedal. Caution must be used in the design to prevent errors from accidental activation		✓	high	med	high

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	• Rarely occurs	N/A					
9. High speed hand/wrist/arm movements or vibration, impact, or torque to the hand	• Rarely occurs	N/A					
10. Exposure to hard edges	• Work surface edge is sharp or unpadded	9. Eliminate exposure to hard edges • round off exposed edges • provide padding for edges • provide a work surface with rounded edges	 ✓ ✓ 	 ✓	 low low med	 med med med	 med med med
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	• Work surface too low	124. Raise the work piece/work surface • adjust current work surface	✓		low	med	med
		79. Provide a work surface which is adjustable in height		✓	high	med	high
		28. Lower the chair	✓		low	med	med
13. Twisting of the lower back	• Location of material and supplies is too low	48. Provide a cart • establish height at same level as machine table (e.g., 29-30 " (74-76 cm) above the floor)	✓	✓	med	med	med
		90. Provide an auxiliary table • fixed, stationary or mobile • adjustable in height	✓	✓ ✓	med med	med med	med med
14. High speed, sudden movements	• Large pieces of material get caught on sharp corners of small work table	57. Provide a larger work surface • increase the size of the existing worktable	✓		med	med	med
		• fabricate table extensions to increase the size to the largest piece of material	✓		med	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	• Inappropriate seating (see Figure 1.1) **Figure 1.1**	86. Provide an appropriate chair		✓	med	med	med

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	• Large bolts of fabric/ticking are too heavy for manual handling (see Figure 1.2) **Figure 1.2** • Fabric is stored in an orientation which is different than that which is required for use	131. Reduce weight of work piece • decrease weight of bolt by ordering shorter lengths of fabric 61. Provide a mechanical lift device • a special purpose hoist/manipulator to handle bolts of fabric 139. Store materials in the same orientation in which they are used • store the bolts in a horizontal orientation	 ✓	 ✓ ✓	 med high low	 med med med	 med high med
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	• Rarely occurs	N/A					
20. Exposure to hard edges on legs, knees, and feet	• Hard or sharp edges and restricted space under machine table interferes with legs	80. Provide adequate leg clearance • reposition the waste tray • modify the machine support 9. Eliminate exposure to hard edges • provide padding for sharp edges	✓ ✓	 ✓ 	low med low	med med med	med med med
21. Awkward leg postures	• Foot pedal is too close or too far away from the employee • Foot pedal is too far away • Foot pedal in not aligned with chair/employee	135. Reposition foot pedal • move the foot pedal away from employee • move the foot pedal closer to the employee • align the foot pedal with the chair • locate the foot pedal to achieve a 100-105 degree angle at the knee and ankle	✓ ✓ ✓	 ✓	low low low med	med med med med	med med med med
22. Standing foot pedal	• Use of mechanical foot pedal	76. Provide a tool which requires minimal force to use • electronic foot pedal		✓	med	med	med

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	• Glare directly from a light source: looking towards an overhead light • Glare from an overhead light reflected off equipment or worksurface.	109. Provide protection from glare from overhead lights/task lights • position work between overhead lights.	✓		low	med	med
		• remove glossy or shiny surfaces from work area	✓		low	med	med
		• place the work station so that it faces a wall or partition.	✓	✓	med	med	med
		• install parabolic louvers to direct light down on the surface.		✓	high	med	med
	• Glare directly from a light source: looking towards an uncovered window • Glare from an uncovered window reflected off equipment or worksurface.	108. Provide protection from glare from natural light • orient work station so that the person faces perpendicular to the window.	✓		low	med	med
		• adjust window coverings	✓		low	med	med
		• provide window coverings		✓	med to high	med	med
	• Glare directly from a light source: looking towards a task light • Glare from a task light reflected off equipment or worksurface.	109. Provide protection from glare from overhead lights/task lights • adjust the task light to reduce glare.	✓		low	med	med
		• turn off the task light.	✓		low	med	med
		• shield task light to prevent it from shining into eyes.		✓	low to med	med	med

Head/Eyes (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	• Light levels too high.	27. Lower the light levels • remove pairs of fluorescent light bulbs from overhead fixtures. Note: this should be done with the appropriate technical assistance and the agreement of co-workers in the area.		✓	low to med	med	med
	• Light levels too low:	22. Increase light levels • provide task light • increase overall light levels to meet the needs of tasks		 ✓ ✓	 med med	 med med	 med med
	• Uncorrected visual disorders cause the person to lean forward to see work	14. Encourage person to have visual disorders corrected	✓		low	med	med
	• Text too small to read. • Text is difficult to read (poor quality)	18. Improve visual access to work • increase size of text • increase the legibility of text	 ✓ ✓	 ✓ ✓	 med med	 med med	 med med
24. Intensive visual tasks, staring at work objects for long periods	• Length of work task without a change of position for the eyes.	8. Distribute intensive activities throughout the process • perform intensive visual tasks for short periods throughout the day (as opposed to in one continuous session).	✓		low	med	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	med