

CASE STUDY - Crimping

TASK TITLE: Crimping

Task Description:	<p>Crimping involves using a manual or power tool to compress two pieces of metal or wire together with a metal band/strap or compress an aluminum connector onto the end of a piece of wire. The manual crimper often resembles a pair of pliers and is commonly used in field applications or on aircraft (fixed work locations). The power crimper is often powered by hydraulic or electrical methods.</p> <p>Typical jobs in which crimping is performed include (not necessarily limited to):</p> <ul style="list-style-type: none">• aircraft maintenance• utilities maintenance/installation• electronics maintenance
Job Performance Measures Most Often Impacted by Crimping:	<ul style="list-style-type: none">• Quality of crimp (strength)• Speed of task completion
Typical Employee Comments about Crimping:	<p>Employees typically complain about discomfort or stiffness in the following areas: hands/wrists/arms and shoulders/neck.</p> <p>The primary body parts affected are typically: hands/wrists/arms</p> <p>The secondary body parts affected are typically: shoulders/neck</p>
Suggested Level II Analysis:	Grip Force Measurement, Elemental Task Analysis

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes	Cost	Impact On		
			✓ Minor Modification	✓ Major Change	Quality	Productivity	
1. Reaching	<p>Work location is too high</p> <ul style="list-style-type: none"> • Work location is too far away (see Figure 1.1) 	<p>123. Raise the person</p> <ul style="list-style-type: none"> • provide a step stool • provide an adjustable platform <p>32. Lower the work piece/work surface</p> <p>38. Move closer to the work location</p> <p>132. Remove obstructions</p> <p>41. Move work piece closer to body</p>	✓ ✓ ✓ ✓ ✓ 	✓ ✓ ✓ ✓ ✓ 	med med med low med low	med med med med med med	med med med med 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 surface is too high or too low (see Figure 1.2) 	123. Raise the person <ul style="list-style-type: none"> provide a step stool provide an adjustable platform 32. Lower the work piece/work surface 136. Rotate the work piece <ul style="list-style-type: none"> turn the work piece so the wrist can be straight while using crimper 	✓ ✓ ✓ ✓	✓ ✓ ✓ low	med med med low	med med med med	med med med med

Figure 1.2

Hands/Wrist/Arm

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"> Work location is too high (see Figure 1.3)  <p>Figure 1.3</p> <ul style="list-style-type: none"> Work orientation is awkward 	<p>66. Provide a power tool</p> <p>123. Raise the person</p> <ul style="list-style-type: none"> provide a step stool provide an adjustable platform <p>32. Lower the work piece/work surface</p> <p>136. Rotate the work piece</p> <ul style="list-style-type: none"> manually turn the work piece so the wrist can be straight while using crimper 	✓ ✓ ✓	✓ ✓ ✓	med med med	med med med
6. Repeated manipulations with fingers	<ul style="list-style-type: none"> Rarely occurs 	N/A				
7. Hyper-extension of finger/thumb or repeated single finger activation	<ul style="list-style-type: none"> Use of tool with single trigger concentrates stress Handle span is too large on manual tool The pliers type tool does not have a spring between the shafts of the handle 	<p>62. Provide a multi-finger trigger</p> <ul style="list-style-type: none"> extend current trigger <p>77. Provide a tool with an appropriate handle angle</p> <ul style="list-style-type: none"> achieve a smaller span <p>70. Provide a spring release mechanism on pliers-type tools</p>		✓ ✓ ✓	low to med med low to med	med med med

Hands/Wrist/Arm-(cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes	Cost	Impact On		
			✓ Minor Modification	✓ Major Change		Quality	Productivity
8. Hand/grip forces	<ul style="list-style-type: none"> Tool or work piece must be manually supported, held or steadied Handle span is too large The type of tool is not appropriate for the amount of crimping (frequency or effort) that must be performed 	<p>118. Provide support for the work piece</p> <ul style="list-style-type: none"> provide a fixture to support work piece <p>76. Provide a tool which requires minimal force to use</p> <ul style="list-style-type: none"> provide a manual tool that crimps with a ratchet mechanism <p>74. Provide a tool that minimizes exposure to vibration/impact/torque</p> <p>88. Provide an appropriate handle diameter</p> <ul style="list-style-type: none"> provide a tool handle with a compressible grip surface provide a tool with an appropriate handle diameter between 1"-1.5" (2.5-3.8cm). <p>66. Provide a power tool</p>		✓ ✓ ✓ ✓ ✓ ✓	med med med med med med	med med med med med med	med med med med med med

Hands/Wrist/Arm-(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"> The work piece must be moved and turned 	118. Provide support for the work piece <ul style="list-style-type: none"> provide a fixture to allow the work piece to be rotated use clamps to hold surrounding wires away from the wire/area where crimping must occur 	✓	✓	med low	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				
10. Exposure to hard edges	<ul style="list-style-type: none"> Tool handle has hard edges (see Figure 1.4) 	94. Provide appropriate handles <ul style="list-style-type: none"> provide a tool with a round, smooth handle with no ridges or edges provide a handle of at least 5" (12.7 cm) in length 		✓ ✓	med med	med med

Figure 1.4

Hands/Wrist/Arm-(cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
		9. Eliminate exposure to hard edges • provide padding for edges • round off exposed edges	✓ ✓		low low	med med	med med
11. Hands and fingers exposed to cold temperatures	• Work area is too cold	105. Provide portable heaters 93. Provide appropriate gloves	✓	✓	med low	med med	med med

Back/Torso

Back/Torso (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes	Cost	Impact On	
			✓ Minor Modification	✓ Major Change	Quality	Productivity
13. Twisting of the lower back	<ul style="list-style-type: none"> Work space is cramped or access is limited (see Figure 1.6)  <p>Figure 1.6</p>	<p>117. Provide support for the upper body</p> <ul style="list-style-type: none"> provide a pad/mat provide a device to support the upper part of the body <p>38. Move closer to the work location</p> <ul style="list-style-type: none"> remove panel or sheet metal to provide additional access 	✓ 	✓ ✓	low med to high med	med med high low
14. High speed, sudden movements	<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
15. Static, awkward back postures	<ul style="list-style-type: none"> • Chair is inadequate • Work surface is too low (see Figure 1.7) 	87. Provide an appropriate chair/stool 124. Raise the work piece/work surface	✓	✓	med	med	med
16. Lifting forces	<ul style="list-style-type: none"> • Rarely occurs 	N/A					
17. Pushing or pulling	<ul style="list-style-type: none"> • Rarely occurs 	N/A					
18. Whole body vibration	<ul style="list-style-type: none"> • 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 	86. Provide an appropriate anti-fatigue mat 96. Provide appropriate shoe inserts 52. Provide a footrail or footrest	✓ ✓ ✓	✓ ✓	med low med	med low med
20. Exposure to hard edges on legs, knees, and feet	<ul style="list-style-type: none"> Work station or work piece has hard or sharp edges (see Figure 1.8) 	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 	✓ ✓	✓	low med low	med med med
21. Awkward leg postures	<ul style="list-style-type: none"> Work surface is too low 	124. Raise the work piece/ work surface 31. Lower the person <ul style="list-style-type: none"> provide a stool to sit on 	✓ ✓	✓ ✓	med med	med med
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. Note: this should be done with the appropriate technical assistance and the agreement of co-workers in the area. <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	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	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