CASE STUDY - Stripping/depainting by Mechanical Methods	
TASK TITLE: Stripping/depainting by Mechanical Methods	
Task Description:	Stripping/depainting by mechanical methods is a process where rust, paint, and other coatings are removed from metal or wood surfaces via mechanized methods. The methods usually involve attaching a grinding wheel or other abrasive material to a drill, or the heating of a surface with a heat gun and then removal by hand. Depending on the object's size and complexity, this task can be performed standing or sitting. Often when the material is worked on, it is clamped onto a work surface to prevent shifting. Then, the part is then moved, rotated, or otherwise manipulated such that all necessary surfaces are accessible to the operator. Typical jobs in which stripping/depainting - mechanically is performed include (but not necessarily limited to): • sheet metal fabrication • HVAC maintenance • facility maintenance
Job Performance Measures Most Often Impacted by Stripping/de-Painting By Mechanical Methods:	Time to completion vs. amount of material removed, avoidance of surface damage Quality of surface (consistency, free of mars)
Typical Employee Comments about Stripping/depainting by Mechanical Methods:	Employees typically complain about discomfort and/or stiffness in the shoulders/neck and hands/wrists, although back and leg stress can be common in some applications. The primary body parts affected are typically: hands/wrists/arms and shoulders/neck. The secondary body parts affected are typically: back/torso and legs/feet.
Suggested Level II Analysis:	Postural Task Analysis, Dynamic Task Analysis

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
1. Reaching	• Work location is too high	123. Raise the person					
		• use a step stool or ladder	✓	✓	med	low	low
		• provide a fixed platform		✓	med	low	low
		• provide an adjustable manlift or scaffolding (for aircraft)		✓	high	med	high
		32. Lower the work piece/work surface					
		• modify existing table	✓		med	med	med
		• provide an adjustable height work table		✓	high	med	high
	• Work location is too far away	38. Move closer to the work location					
		• remove obstructions	✓		low	med	med
		41. Move work piece closer to body	✓		low	med	med
	• Work location is blocked or is in an inappropriate orientation	136. Rotate the work piece					
		• provide a fixture to allow the work piece to be rotated		✓	med	med	med
		• rotate the work piece manually	✓		low	med	med
2. Arm forces: Repeated contraction of the muscles of the arm or holding/ carrying materials	• Tool requires high forces to remove material	76. Provide a tool which requires minimal force to use					
	• Large quantity of material must be removed	• replace grinding media regularly	✓		low	med	med
		• repair the tool for maximum performance	✓		low	med	med
		13. Encourage ergonomic work techniques					
		• let the tool do the work	✓		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
3. High speed, sudden shoulder movements	• Rarely occurs	N/A					
4. Head/neck bent or twisted	• Work location is too low (see Figure 1.1) **Figure 1.1**	124. Raise the work piece/work surface • provide a fixed table to support work piece • provide an adjustable table to raise and/or angle part towards the worker	✓	✓ ✓	med high	med med	med high
		31. Lower the person • provide a chair/stool to sit on for some of the task	✓	✓	med	med	med
	• Work location is too high	123. Raise the person • use a step stool or ladder • provide a fixed platform • provide an adjustable platform or scaffolding	✓	✓ ✓ ✓	med med high	med med med	med med high

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	• Handle angle on tool causes awkward wrist postures	77. Provide a tool with an appropriate handle angle					
		• provide a tool which can be angled/bent for different tasks		✓	med	med	med
		• attach a pistol-type handle to tool, when appropriate		✓	med	med	med
	• Work location is too high	123. Raise the person					
		• use a step stool or a ladder	✓	✓	med	med	med
		• provide a fixed platform		✓	med	med	med
		• provide an adjustable manlift or scaffolding		✓	high	med	high
6. Repeated manipulations with fingers	• Rarely occurs	N/A					
7. Hyperextension of finger/thumb or repeated single finger activation	• Use of tool with single finger trigger	62. Provide a multi-finger trigger					
		• provide a tool with a two finger or a four finger trigger		✓	med	med	med
		• extend trigger on existing tool (if feasible and safe)		✓	med	med	med
		10. Eliminate need to constantly hold trigger		✓	med	med	med
		• provide a tool with toggle switches that allow continuous operation without holding the trigger down					

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	• Tool requires high forces to remove material • Large quantity of material must be removed	76. Provide a tool which requires minimal force to use • substitute a higher grit for removal of large amounts of material • replace grinding media regularly • repair the tool for maximum performance	✓ ✓ ✓		low low low	med med med	med med med
		66. Provide a power tool • obtain a heavier duty tool which reduces forces and time required to remove material		✓	med to high	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
	• Tool must be manually supported, held or steadied	54. Provide a high friction gripping surface					
		• provide a tool handle with a compressible, high friction surface		✓	med	med	med
		• wrap the handle with friction tape	✓		low	med	med
		116. Provide support for the tool					
		• provide a tool balancer for bench work		✓	med	med	med
		• provide a mobile tool balancer that can be hung overhead for field work, if appropriate		✓	med	med	med
		113. Provide support for the cable or hose					
		• provide a hook to hang cable in work area	✓		low	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
11. Hands and fingers exposed to cold temperatures	• Cold exhaust from air powered tool blows on hand	7. Direct cold air away from hands • provide tool which does not blow cold air on the hands		✓	med	med	med
		• provide an air diverter on existing tools		✓	med	med	med
		93. Provide appropriate gloves • (Caution: gloves of an inappropriate material or size can cause person to increase hand forces to perform task)	✓		low	med	med
	• Work area is too cold	23. Increase room temperature		✓	med	med	med
		105. Provide portable heaters		✓	med	med	med
		110. Provide shields or barriers from the wind		✓	med	med	med
		93. Provide appropriate gloves	✓		low	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	• Rarely occurs (see question #15)	• N/A					
13. Twisting of the lower back	• Work location is blocked or is in an inappropriate orientation	136. Rotate the work piece • 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	• 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	• Work location is too low (see Figure 1.2) **Figure 1.2**	124. Raise the work piece/work surface					
		• provide a fixed table to support work piece	✓	✓	med	med	med
		• provide an adjustable table for work piece		✓	high	med	high
	• Work location is too far away	38. Move closer to the work location					
		• remove obstructions	✓		low	med	med
		41. Move work piece closer to body	✓		low	med	med
	• Inadequate lower back support	115. Provide support for the lower back					
	• Inappropriate chair adjustment.	• adjust back rest to support lower back	✓		low	med	med
	• Inappropriate chair design	• pull chair forward and lean back while working	✓		low	med	med
		• attach a small pillow to back rest to support lower back	✓		low	med	med
		provide a chair with adequate lower back support		✓	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	• 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	• Standing surface is hard (see Figure 1.3) **Figure 1.3**	86. Provide an appropriate anti-fatigue mat		✓	med	med	med
		96. Provide appropriate shoe inserts	✓		low	med	med
20. Exposure to hard edges on legs, knees, and feet	• Front edge of seat is hard or square	64. Provide a cushion • to reduce exposure to front edge of seat	✓		low	med	med
		87. Provide an appropriate chair/stool • provide chair with rounded front edge of seat		✓	med	med	med

Legs/Feet (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	• Kneeling causes external pressure to the knee	95. Provide appropriate knee protection • provide knee pads • provide a cushion to kneel on	 ✓ ✓		 low low	 med med	 med med
	• Work station or work piece has hard edges	9. Eliminate exposure to hard edges • lay a blanket or cushion over hard edges	✓		low	med	med
21. Awkward leg postures	• Work location is too low	124. Raise the work piece/work surface • provide a fixed table to support work piece • provide an adjustable table for work piece 31. Lower the person • provide a chair/stool to sit on	 ✓ ✓	 ✓ ✓	 low high med	 med med med	 med high med
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					