

CASE STUDY - Forming

TASK TITLE: Forming

Task Description:	<p>Forming is a manual task which is typically performed to create a small volume (e.g., one) of special purpose metal parts. The process involves forcing, deforming, or pressing a piece of sheet metal around a wood mold or pattern. The pattern defines the shape of the final part. Depending on the part shape, tools such as hammers, or other heavy weight metal bars may be used.</p> <p>Typical jobs in which forming may occur include (not necessarily limited to):</p> <ul style="list-style-type: none">• metal fabrication• model shop• zone or facilities maintenance. <p>The task is usually performed on a work table and may require the use of a vise to stabilize the pattern.</p>
Job Performance Measures Most Often Impacted by Forming:	Dimensional accuracy, time taken to completion.
Typical Employee Comments about Forming:	<p>Employees report that manual forming is one of the hardest or most physically demanding jobs in the department.</p> <p>The primary body regions affected by manual forming include the hands/wrists/arms, shoulder/neck and (upper)back/torso.</p> <p>The secondary body region affected is the (lower) back/torso.</p>
Suggested Level II Analysis:	Grip Force Measurement, Dynamic Task Analysis

Shoulder/Neck

Job Factor	Potential Causes	position Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
1. Reaching	<ul style="list-style-type: none"> The work piece is too high 	32. Lower the work piece/work surface <ul style="list-style-type: none"> lower the work table or bench 	✓		low	med	med
2. Arm forces: Repeated contraction of the muscles of the arm or holding/carrying materials	<ul style="list-style-type: none"> Use of manual tool is inappropriate for the task Material is difficult to form/mold 	66. Provide a power tool <ul style="list-style-type: none"> provide a vibration-controlled impact tool 		✓	high	med	high
		15. Heat metal/material to make more pliable <ul style="list-style-type: none"> provide gloves to protect hands from heat 		✓	med	med	med
3. High speed, sudden shoulder movements	<ul style="list-style-type: none"> Use of manual tool is inappropriate for the task Material is difficult to form/mold 	66. Provide a power tool <ul style="list-style-type: none"> provide a vibration-controlled impact tool 		✓	high	med	high
		15. Heat metal/material to make more pliable <ul style="list-style-type: none"> provide gloves to protect hands from heat 		✓	med	med	med
4. Head/neck bent or twisted	<ul style="list-style-type: none"> Work piece orientation is awkward 	136. Rotate the work piece <ul style="list-style-type: none"> rotate the work piece manually by changing its in the vice provide a special purpose fixture 	✓		low	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"> Use of manual tool is inappropriate for the task 	66. Provide a power tool <ul style="list-style-type: none"> provide a vibration-controlled impact tool 		✓	high	med	high
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"> Rarely occurs 	N/A					
8. Hand/grip forces	<ul style="list-style-type: none"> Use of manual tool is inappropriate for the task Maintaining grip on manual tool is difficult 	66. Provide a power tool <ul style="list-style-type: none"> provide an vibration-controlled impact tool 54. Provide a high friction gripping surface <ul style="list-style-type: none"> provide padding/wrapping to provide a compressible gripping surface on hammer or other tools 	✓	✓	high low	med med	high 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"> Use of manual tool is inappropriate for the task 	66. Provide a power tool <ul style="list-style-type: none"> provide a vibration-controlled impact tool 		✓	high	med	high
10. Exposure to hard edges	<ul style="list-style-type: none"> Tool handle has hard edges Workstation has hard or sharp edges 	9. Eliminate exposure to hard edges <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" in length 		✓ ✓	med med	med med	med med
		9. Eliminate exposure to hard edges <ul style="list-style-type: none"> provide padding for edges round off exposed edges 	✓	✓	low med	med med	med med
11. Hands and fingers exposed to cold temperatures	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • Work location is too high • Work location is too low 	32. Lower the work <ul style="list-style-type: none"> • piece/work surface lower the work table or bench 	✓		low	med	med
		123. Raise the person <ul style="list-style-type: none"> • provide a stable platform 	✓		low	med	med
		124. Raise the work piece/work surface <ul style="list-style-type: none"> • raise the work station on blocks • raise the fixture or vise • provide an adjustable work table 	✓ ✓	✓	low low med	med med med	med med med
13. Twisting of the lower back	<ul style="list-style-type: none"> • Work piece orientation is awkward 	136. Rotate the work piece <ul style="list-style-type: none"> • rotate the work piece manually by changing its position in the vice • provide a special purpose fixture 	✓	✓	low med	med med	med med
		17. Improve floor condition <ul style="list-style-type: none"> • improve housekeeping • clean/dry floor prior to performing the task • wear the appropriate shoes/sole for floor surface and work environment 	✓ ✓ ✓		low low low	low low low	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
15. Static, awkward back postures	<ul style="list-style-type: none"> Rarely occurs 	N/A					
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 • Standing in a fixed position for prolonged periods 	86. Provide an appropriate anti-fatigue mat		✓	med	med	med
		96. Provide appropriate shoe inserts	✓		low	med	med
		13. encourage ergonomic work techniques • encourage employee to walk periodically	✓		low	med	med
20. Exposure to hard edges on legs, knees, and feet	<ul style="list-style-type: none"> • Rarely occurs 	N/A					
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

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"> Rarely occurs 	N/A					
24. Intensive visual tasks, staring at work objects for long periods	<ul style="list-style-type: none"> Rarely occurs 	N/A					