

CASE STUDY - Turning Valves

TASK TITLE: Turning Valves

Task Description:	<p>Valves are turned for a variety of reasons. Some valves are turned to achieve a desired level of acceptance of a piece of equipment being tested on a machine. Other valves are turned (usually with a much greater force or resistance) to control the flow of liquid (e.g., fuel or water) through a piping system. Valves may be small (e.g., fist-sized) or large (e.g., steering wheel-sized) and may be circular or disguised as a lever.</p> <p>Typical tasks that involve turning valves include:</p> <ul style="list-style-type: none">• Fuel Access Tester• Oxygen Mask Tester• Facility Maintenance Boiler Rooms• Liquid Fuels Maintenance. <p>The task of turning valves can be performed on the floor, on bench tops, and overhead.</p>
Job Performance Measures Most Often Impacted by Turning Valves:	Ability of the worker to turn valve quickly to the desired position.
Typical Employee Comments about Turning Valves:	Employees typically complain about discomfort and/or stiffness in the back, wrists, and shoulders. The primary body regions of concern are: back/torso, shoulder/neck The secondary body regions of concern are: hands/wrists
Suggested Level II Analysis:	Postural Analysis, Grip Force Measurement, Push/Pull 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 (e.g., turning valves in boiler room) (see Figure 1.1)  <p>Figure 1.1</p>	123. Raise the person	✓	✓	med	med	med
		<ul style="list-style-type: none"> use a step stool, platform or ladder 32. Lower the work piece/work surface <ul style="list-style-type: none"> relocate frequently used valves to 38"-42" (92cm-107cm) 		✓			

Shoulder/Neck (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"> Work location is too far away (eg., valve or lever location is too far away (see Figure 1.2))  <p style="text-align: center;">Figure 1.2</p>	38. Move closer to the work location 132. Remove obstructions	✓ ✓		low low	med med	med med
2. Arm forces; contraction of the muscles of the hand or holding/carrying materials	<ul style="list-style-type: none"> Valve condition makes turning difficult Valve design requires high force 	101. Provide control which does not require excessive forces <ul style="list-style-type: none"> inspect and replace valves to minimize force remove rust/lubricate valves as needed provide alternative lever/valve design 	✓	✓ ✓	med low high	med med med	high high high

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	<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 high (see Figure 1.3)  <p style="text-align: center;">Figure 1.3</p>	123. Raise the person <ul style="list-style-type: none"> use a step stool, platform or ladder to read gauges provide an adjustable platform 32. Lower the work piece/work surface <ul style="list-style-type: none"> lower gauges 	✓	✓ ✓ ✓	med high med to high	med med med	med high med

Shoulder/Neck (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"> Work location is blocked or is in an inappropriate orientation (see Figure 1.4)  <p>Figure 1.4</p>	136. Rotate the work piece <ul style="list-style-type: none"> turn the gauge 	✓		low	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"> Valve is blocked or is in an inappropriate orientation Valve is too high 	132. Remove obstructions		✓	med to high	med	high
		123. Raise the person <ul style="list-style-type: none"> use a step stool or ladder 	✓	✓	med	med	med
		32. Lower the work piece/work surface <ul style="list-style-type: none"> lower the valve 		✓	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					

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	<ul style="list-style-type: none"> Valves require high force to turn <ul style="list-style-type: none"> – large motions for small increments of change – high frictional forces of mechanics or valve due to design or maintenance of valve 	101. Provide controls which do not require excessive forces <ul style="list-style-type: none"> inspect and maintain equipment to ensure valves are maintained to minimize forces design valves to reduce high force characteristics of valves 	✓	✓	low to med high	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					
10. Exposure to hard edges	<ul style="list-style-type: none"> Rarely occurs 	N/A					
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"> Valve location is too low (see Figure 1.5)  <p style="text-align: center;">Figure 1.5</p>	124. Raise the work piece/work surface <ul style="list-style-type: none"> place the valve location at 38"-42" (92cm-107cm) above the floor 		✓	high	med	high
	<ul style="list-style-type: none"> Work location too far away 	38. Move closer to the work location <ul style="list-style-type: none"> step over obstructions 	✓		low	med	med
		132. Remove obstructions <ul style="list-style-type: none"> re-design piping 		✓	high	med	high
13. Twisting of the lower back	<ul style="list-style-type: none"> Valve location is blocked or is in an inappropriate orientation 	136. Rotate the work piece <ul style="list-style-type: none"> turn the valve orientation 		✓	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
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					
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 	96. Provide appropriate shoe inserts	✓		low	low	med
20. Exposure to hard edges on legs, knees, and feet	<ul style="list-style-type: none"> Front edge of seat is hard or square Piping system on floor (if kneeling) 	9. Eliminate exposure to hard edges	✓		low	low	med
		<ul style="list-style-type: none"> Use a cushion eliminate exposure to pressure point 					
		87. Provide an appropriate chair/stool		✓	med	low	med
		<ul style="list-style-type: none"> provide chair with rounded front edge of seat 					
21. Awkward postures	<ul style="list-style-type: none"> Valve that is too low may require worker to kneel or squat 	9. Eliminate exposure to hard edges	✓		low	low	med
		<ul style="list-style-type: none"> provide padding for edges/pipes and surrounding structure 	✓		low	low	med
		<ul style="list-style-type: none"> provide knee pads 					
21. Awkward postures	<ul style="list-style-type: none"> Valve that is too low may require worker to kneel or squat 	124. Raise work piece/work surface place valve location at 38"-42" (92cm-107cm)		✓	high	med	high
		9. Eliminate exposure to hard edges	✓	low	low	med	
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. Light levels are too low/too high	<ul style="list-style-type: none"> Light levels are too low for reading gauges 	22. Increase light levels <ul style="list-style-type: none"> increase room lighting clean gauge/replace glass 	✓	✓	med low	med low	med low
24. Intensive visual tasks, staring at work objects for long periods	<ul style="list-style-type: none"> Rarely occurs 	N/A					