

CASE STUDY - Mediablasting - Blast Cabinet

TASK TITLE: Mediablasting - Blast Cabinet

<p>Task Description:</p>	<p>Media blasting involves using an air system in which grit is entrained making a very abrasive stream. This combination is effective for removing paint, rust, and other coatings. It is particularly effective for removing coverings and coatings from irregularly shaped surfaces (generally metals) where sanding or liquid dunking is not possible or practical.</p> <p>This task is performed while standing or sitting on a tall stool. Hands are placed into gloves which are extended into the media blasting enclosure or cabinet. The part to be cleaned/stripped is inside of the enclosure as is the high pressure nozzle. The abrasive stream is then aimed, via the nozzle, to the surfaces of the part to be cleaned/stripped. The part is then moved, rotated, or otherwise manipulated such that all necessary surfaces are accessible to the operator. Parts are loaded and unloaded through a door in the side of the enclosure.</p> <p>Typical jobs in which media blasting is performed include (not necessarily limited to):</p> <ul style="list-style-type: none"> • coating and plating operations • finishing/painting operations • rework operations.
<p>Job Performance Measures Most Often Impacted by Mediablasting:</p>	<p>Complete removal of desired material Completion of task in desired period of time</p>
<p>Typical Employee Comments about Mediablasting:</p>	<p>Employees typically complain about discomfort and/or stiffness in the hands/wrists/arms, the shoulders/neck, the lower back, and the legs/feet.</p> <p>The primary body regions of concern are: shoulders/neck, hands/wrists/arms The secondary body regions of concern are: back/torso, legs/feet</p>
<p>Suggested Level II Analysis:</p>	<p>Grip Force Measurement, Posture Analysis</p>

Shoulders/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"> • Arm portals are too high • Work piece is too high 	123. Raise the person <ul style="list-style-type: none"> • provide several fixed-height platforms which can be easily moved into place for different sized people • provide a height-adjustable platform 	✓		low	med	med
		32. Lower the work piece/work surface <ul style="list-style-type: none"> • provide an ability to adjust the height of the work piece inside the cabinet 	✓	✓	med	med	med
		112. Provide support for the arms <ul style="list-style-type: none"> • provide a padded, compressible surface to rest arms • provide adjustable arm supports that are mounted at the base of the arm portals 	✓		low	med	med
					✓	med	med
2. Arm forces: Repeated contraction of the muscles of the arm or holding/carrying materials	<ul style="list-style-type: none"> • Force required to control blasting nozzle 	116. Provide support for the tool <ul style="list-style-type: none"> • provide an articulating arm to support and resist the reaction force of the blasting nozzle 		✓	med	med	med

Shoulders/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"> • Holding work piece while blasting 	118. Provide support for the work piece <ul style="list-style-type: none"> • provide a fixture or clamp to stabilize the work piece • the fixture should allow the component to be rotated (as necessary to present all surfaces which need to be blasted) 		✓ ✓	med high	med med	med high
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 low • Worker cannot view part detail necessary without bending neck 	124. Raise the work piece/work surface <ul style="list-style-type: none"> • add risers inside cabinet 136. Rotate the work piece <ul style="list-style-type: none"> • provide a fixture to allow the component to be rotated to the desired position 	✓	✓	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"> • Orient manual positions of the component • The need to position the blast nozzle 	136. Rotate the work piece <ul style="list-style-type: none"> • provide a fixture to allow the component to be rotated to the desired position 		✓	med	med	med
		75. Modify the tool <ul style="list-style-type: none"> • add an auxiliary handle to the nozzle 		✓	med	med	med
		<ul style="list-style-type: none"> • redesign the nozzle/hose to incorporate hinge/pivot feature 		✓	med	med	high
6. Repeated manipulations with fingers	<ul style="list-style-type: none"> • Rarely occurs 	N/A					
7. Hyperextension 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"> Positioning nozzle creates resistance Inadequate grip surface 	116. Provide support for the tool <ul style="list-style-type: none"> provide an articulating arm support to resist the reaction force of the blasting nozzle. This tool support should have a pivot capability to allow the operator to guide the tool without applying a large amount of force 		✓	med	med	med
		145. Modify the tool <ul style="list-style-type: none"> add an auxiliary handle 		✓	low	med	med
9. High speed hand/wrist/arm movements or vibration, impact, or torque to the hand	<ul style="list-style-type: none"> High speed movements required for some blasting tasks Blasting causes exposure to vibration 	20. Incorporate rest pauses	✓		low	med	med
		25. Increase task variety	✓		low	med	med
		116. Provide support for the tool <ul style="list-style-type: none"> provide a tool balancer that absorbs the shock and vibration 		✓	med	med	med
		74. Provide a tool that minimizes exposure to vibration/ impact/ torque <ul style="list-style-type: none"> provide a nozzle with vibration dampening material built into the handle 		✓	med	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
10. Exposure to hard edges	<ul style="list-style-type: none"> • Hard edges on blasting nozzle 	9. Eliminate exposure to hard edges <ul style="list-style-type: none"> • provide a nozzle with a handle which is round and smooth with no ridges or edges • cover or wrap hard edges (Caution: be sure not to increase the handle diameter significantly greater than 1.5". This can increase grip forces required) 		✓	med	med	med
			✓	low	med	med	
	<ul style="list-style-type: none"> • Hard edges on arm portals 	9. Eliminate exposure to hard edges <ul style="list-style-type: none"> • pad the edges of the arm portal with a compressible material 	✓	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"> Rarely occurs 	N/A					
13. Twisting of the lower back	<ul style="list-style-type: none"> Picking up the blast nozzle from the bottom of the cabinet Reaching to access remote areas of the work piece 	116. Provide support for the tool <ul style="list-style-type: none"> provide a tool balancer provide a hook 	✓	✓	med low	med med	med med
		118. Provide support for the work piece <ul style="list-style-type: none"> provide a fixture to support the work piece the fixture should allow the component to be rotated (as necessary to present all surfaces which need to be blasted) 		✓	med	med	med
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"> • Arm portals are too low • Work piece is too low 	124. Raise the work piece/ work surface	✓	✓	med	med	med
		<ul style="list-style-type: none"> • raise the height of the arm portals so everyone can operate the blast cabinet without having to bend over • provide an ability to adjust the height of the work piece using risers inside cabinet 		✓	med	med	med
		31. Lower the person	✓	✓	med	med	med
		<ul style="list-style-type: none"> • provide a chair (assumes that leg clearance is available for sitting) or sit stand stool • provide several fixed-height platforms which can be easily moved into place for different sized people • provide an height-adjustable platform 		✓	low	med	med
				✓	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
	<ul style="list-style-type: none"> • Work location is too far away 	41. Move work piece closer to body	✓		low	med	med
		136. Rotate the work piece <ul style="list-style-type: none"> • provide a fixture to allow the work piece to be rotated 		✓	med	med	med
	<ul style="list-style-type: none"> • Inadequate leg clearance for sitting • Inadequate lower back support • Inappropriate chair adjustment • Inappropriate chair design 	80. Provide adequate leg clearance <ul style="list-style-type: none"> • provide a blast cabinet that provides adequate leg clearance for sitting while blasting 		✓	med	med	med
		115. Provide support for the lower back <ul style="list-style-type: none"> • adjust back rest to support lower back 	✓		low	med	med
		<ul style="list-style-type: none"> • pull chair forward and lean back while working • attach a small pillow to back rest to support lower back • provide a chair with adequate lower back support 	✓	✓	low	med	med
16. Lifting forces	<ul style="list-style-type: none"> • if occurring, see Lifting Case Study 	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 	87. Provide an appropriate chair/stool		✓	med	med	med
		5. Change posture frequently	✓		low	med	med
		52. Provide a footrail or footrest	✓	✓	med	low	low
		86. Provide an appropriate anti-fatigue mat		✓	med	med	med
		96. Provide appropriate shoe inserts	✓		low	low	low
20. Exposure to hard edges on legs, knees, and feet	<ul style="list-style-type: none"> Knees press against hard side of cabinet 	9. Eliminate exposure to hard edges <ul style="list-style-type: none"> attach a pad to the blast cabinet to protect the knees 	✓		low	med	med
21. Awkward leg postures	<ul style="list-style-type: none"> Rarely occurs 	N/A					
22. Standing foot pedal	<ul style="list-style-type: none"> Standing foot pedal causes awkward leg and back postures 	134. Replace standing foot pedals with alternative controls <ul style="list-style-type: none"> provide a remote, hand operated control 		✓	med	med	med
		145. Modify footpedal <ul style="list-style-type: none"> provide a heel block recess footpedal off the front end of a platform 	✓ ✓		low low	med 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	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> position work between overhead lights. remove glossy or shiny surfaces from work area place the work station so that it faces a wall or partition. install parabolic louvers to direct light down on the surface. 	✓		low	med	med
			✓		low	med	med
			✓	✓	med	med	med
				✓	high	med	med
	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> orient work station so that the person faces perpendicular to the window. adjust window coverings provide window coverings 	✓		low	med	med
			✓	✓	low med to high	med med	med med
	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> adjust the task light to reduce glare. turn off the task light. shield task light to prevent it from shining into eyes. 	✓		low	med	med
			✓	✓	low low to med	med 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
	<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. <p>Note: this should be done with the appropriate technical assistance and the agreement of co-workers in the area.</p> <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 		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>low to med</p> <p>med med</p> <p>low</p> <p>med med</p>	<p>med</p> <p>med med</p> <p>med</p> <p>med med</p>	<p>med</p> <p>med med</p> <p>med</p> <p>med med</p>
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). 	<p>✓</p>		<p>low</p>	<p>med</p>	<p>med</p>

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 <ul style="list-style-type: none"> periodically look away from screen. 	✓		low	med	med

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