

Ergonomic Risk Assessment

Naval Facilities Engineering Command (NAVFAC) East Division

An ergonomic risk assessment was conducted on January 30th, 2000. The Motor Repair Shop was observed in order to identify sources of ergonomic stress and make recommendations to reduce the risk of work-related musculoskeletal disorders (WMSDs). This assessment is based upon interviews with employees, supervisors, and safety personnel as well as evaluation by the NAVFAC Hazard Abatement East Coast occupational ergonomist. The Job Requirements Physical Demands Survey (JR/PD), an ergonomic survey, was also administered to the employees. The results of the JR/PD indicate that this area is not an Ergonomic Problem Area, but risk factors for WMSDs are present. Appendix I contains a summary of the JR/PD results as well as a description of the methodology.

Recommendations to reduce the risk of WMSDs include considering equipment purchase, process redesign, and implementation of administrative controls. Recommendations are included with as much vendor information as possible to assist in the evaluation of products and services. Input gathered from the workers, safety specialists, and other personnel to evaluate equipment before purchasing is recommended. This process will increase product acceptance, test product usability, and durability and take advantage of employee experience.

While the results of the JR/PD do not indicate an Ergonomic Problem Area, all three respondents indicated that the operation is hard. JR/PD results also indicate that employees are experiencing work related pain or discomfort, which does not improve away from work and has interfered with carrying out normal activities. While discomfort was not reported, the presence of reduced recovery time and normal activity interruption indicates a risk of WMSDs. The JR/PD indicates the presence of WMSDs, which places the employees at a greater risk of developing new WMSDs or aggravating the pre-existing condition.

Motor Repair Shop

Twelve active duty personnel are assigned to the Motor Repair Shop. Three employees work in this area full-time. Employees work between 40 and 70 hours each week. Operators receive training on proper lift techniques every 6 months.

Motors from docked Ships are sent to the Motor Repair Shop. The operators inspect motors for damage, ensure proper balancing, and inspect for wear and tear on bearings. About 20 motors are processed each month. Each motor is manually handled four to six times during processing. A motor can weigh between 5 and 2,000 lbs. The motors arrive on a cart and are manually pushed onto the sound block, as shown in figure 1. Manually pushing a heavy motor requires excessive force and places strain on the back, legs, arms, and shoulders. If one employee can't move the motor on his own, he requests help from another employee. There is a hoist in the area that is used when two employees can not handle the weight of the motor. The current hoist is attached to a mobile gantry crane. The gantry crane does not easily fit around the sound block and a motor swinging from an unstable mobile crane poses a safety hazard.



Figure 1: Pushing motor from cart onto sound block

Rotors, weighing up to 350 lbs., are also balanced in the shop. Rotors are lifted from a cart onto a balance machine that has a load height of 53", as shown in figure 2. Three people are required to move the heaviest rotors. Two people hoist the rotor onto their shoulders and a third person helps lift the rotor onto the balance machine. Lifting the rotor to such a tall height requires excessive force and places strain on the back, arms, and shoulders.



Figure 2: Placing rotor on balance machine

Recommendations:

Boom and Hoist

Install a fixed boom, attached to the wall, over the motor balancing machine to eliminate the need for manually pushing motors onto the balancing block. A boom with an electric hoist and trolley are recommended. A bucket for the chain is suggested. Ensure that proper straps are used to attach the motor to the hoist in order to fully support the load. When ordering, select the appropriate voltage and phase for the facility. All beam, trolley, and hoist recommendations were based upon a 2,000 lb. capacity. The capacity rating of the boom should never be exceeded by the combined weight of the motor, trolley, and hoist.

Boom and Hoist		
Vendor	Product	Price
Grainger 601-372-2525 (Jackson, MS)	Dayton Electric Chain Hoist Model 3Z372 16 ft/min. 10 ft. chain	\$1340
	Wall Mounted Full Cantilever Model 4ZX96	\$827
	Heavy Duty Trolley Model 4Z465	\$195.75
	Steel Chain Container Model 2Z618	\$29.05
Vestil Manufacturing 1-800-526-3133	92" I-Beam Model JIB-LC-20-92	\$560
	Hoist and Trolley combination Model HW/T-20 16 ft/min. 10 ft. chain	\$2169
C&H 1-800-558-9966	Coffing Heavy-Duty Dual Brake Hoist Model 72-202DV 16 ft./min 10 ft. lift	\$1748.7
	CONTRX Full 180° Cantilever Wall Mount Jib Crane Model 72-464D	\$575.70
	Universal Wide Flange Trolleys Model 72-803A	\$139.40

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Cantilever Wall-Mounted Boom



Electric Hoist

Mobile Hoist

A hoist is recommended for loading and unloading rotors onto the balancing machine. A mobile crane or jack is recommended to eliminate the manual lifting and transporting of rotors. Consideration should be given to the available space and the size of the hoist. A jack may need to be retrofitted with a jig or sling to hold a rotor in place.

Mobile Hoist		
Vendor	Product	Price
Grainger 601-372-2525 (Jackson, MS)	Air/Hydraulic High –Lift Transmission Jack Model 5M466 1000 lb. Capacity Height Range from 37” to 80” Base Dimensions 32.25”x32.25”	\$980.50
Lab Safety 1-800-356-0783	Hydraulic Folding Floor Crane Model OM-64599 4400 lb. capacity Base Dimensions 38”x68.5”	\$338.20
C&H 1-800-558-9966	Standard and Space-Saver Mobile Cranes Model 70-562D 1200-5000 lb. capacity Base Dimensions 40”x66”	\$1001.70



High Lift Transmission Jack



Engine Crane

*Some information has been removed from this report that is specific to the activity.