South Carolina Department of Labor, Licensing and Regulation
Division of Labor
Office of Occupational Safety and Health
Columbia, South Carolina 29211

**Attachment**
**OSH Program Directive Number 75-1910.93/95-1/2**

I. ENGINEERING NOISE CONTROL MEASURES (Specific)
Engineering controls which reduce the sound intensity either at the source of the noise or in the hearing zone of the workers.

A. MAINTENANCE
1. Replacement or adjustment of worn, loose or unbalanced parts of machines.
2. Lubrication of machine parts.

B. SUBSTITUTION OF MACHINES
1. Larger, slower machines for smaller, faster ones.
2. Belt drives for gears.
3. Quieter bearings (i.e. needle bearings instead of ball bearings.)
4. Water or air jet looms for shuttle looms.

C. VIBRATION DAMPENING
1. Increase mass (weight) cast iron instead of sheet metal, where appropriate.
2. Increase stiffness particularly of machinery panels and ductwork. Damp panels.
3. Use rubber or plastic bumper or cushions.
4. Change size of noise parts to change resonance frequency.

D. REDUCING SOUND TRANSMISSION THROUGH SOLIDS
1. Flexible mountings.
2. Flexible sections in pipe runs.
3. Flexible shaft couplings.
4. Fabric sections in ducts.
5. Resilent flooring.

E. REDUCING SOUND PRODUCED BY AIR OR GAS FLOW
1. Intake and exhaust mufflers particularly for compressors.
2. Fan blades designed to reduce turbulence.
3. Large, low speed fans for smaller, high speed fans.

F. INCLUDE NOISE LEVEL SPECIFICATIONS WHEN ORDERING NEW EQUIPMENT

G. ISOLATING NOISE SOURCES
1. Partially enclose individual machines.

2. Use baffles.
3. Confine high noise machines to insulated room.
4. Enclose electric motors to absorb sound.

H. ISOLATING OPERATOR

Provide a sound-reducing booth for the operator or attendant of one of more machines.

Controlling noise at the source is the ideal means of preventing induced hearing loss. The results are relatively long lasting; the operator of the individual machine is protected, as well as those employees at a distance from it. The measures listed under G2, G3, and H, will if effective, limit the number of persons exposed to high noise levels, but are unlikely to protect the operators and those close to the noise sources.

A number of the listed controls can be accomplished quite inexpensively by plant personnel. Others require considerable expense and highly specialized technical knowledge to ensure the expected results. It is therefore strongly recommended that plants that consider all methods of compliance above have an in-depth sound study made of uncontrollable areas as follows:

STEP 1. Octave band analysis on all critical areas. Table G-16 of 1910.95

2. Dosimeter readings on selected employees in critical areas. CFR 1910.95

3. Exact recommendations for engineering changes and installation of certain and specified acoustical materials.

II. EXAMPLES OF FEASIBLE CONTROL MEASURES WHICH HAVE HELPED TO REDUCE NOISE LEVELS

Description: Partial enclosure, (metal and polyurethane) on the tube drive ring twister.
Location: U.S. Textile Machine Co., Scanton, Pennsylvania.
Reference: Sound and Vibration Magazine (SV), May 1971, page 20

Description:
1. 4 inch fiberglass material on ceiling and wall.
2. Ribbed matting between looms.
3. Plastic pickers.
4. Felt shuttle cocks.
5. Plastic hammer.

Location: Weaving Mill, (Olympia, Washington)
Reference: Journal – American Industrial Hygiene Association, January 1969, page 71

Description: Floor matting, absorbent walls and ceiling.
Location: Near looms, weaving mill.

Reference: Journal, American Industrial Hygiene Association, March-April 1968, page 93.

Description: Spinning and yarn manufacture.
Location: Textile Manufacturing Plant, Raleigh, North Carolina.
Reference: Journal, American Industrial Hygiene Association, May 1971, page 63.

Description: Composition motor gears soft picker stick bumpers, close tolerance bearings, etc.
Location: Looms and weave room, "Cyril Johnston Mills" in Stafford Springs, Connecticut.
Reference: Textile Industries Magazine, May 1972, page 101.

Description: Use of flexible spindle mounts, with limited "in balance".
Location: Draw twisting.
Reference: Textile World, November 1973, page 38.

Description: Enclose narrow fabric looms and use of air nozzle.
Location: "Hanes Corporation", Winston-Salem, North Carolina
Reference: Textile World, February 1974, page 37.

Description: Place shock mounts (hard rubber) on shuttle loom.
Location: "Uniroyal Inc.", Hogansville, Georgia.
Reference: Loren B. Canada, III – Macon Area Office OSHA

Description: Long staple drawing frame and rollers.
Location: Carpet yarn spinning at Integrated Products of Rome, Georgia.
Reference: Textile World, November 1973, page 37.

Description: Maintenance of pirn and spindle during high twisting.
Location: Northeastern Enterprises
Reference: Textile World, November 1973, page 38.

Description: Sling shuttle with proper shuttle velocity and exact shuttle stop.
Location: "Noxxe Inc.", Bedford, Massachusetts.
Reference: Textile World, November 1973, page 54.

Description: Shuttleless looms, air and water jet looms. (Wovens, wools, worsted, cotton, silk, synthetics).
Location: (Various U.S. Locations).
Reference: Textile World, February 1974, page 51-57

Description: Hand tool, utility equipment, compressed air, vacuum turning for hosiery, enclose narrow fabric loom.
Location: "Weeks Plant," Winston-Salem, North Carolina.

Reference: Textile World, February 1974, page 37.

Description: Shuttleless looms. Improved noise conditions.
Location: Georgia Synthetics, "Webco".
Reference: Textile World, March 1974, page 110.

Description: Spinning area fan motor housing fan removal, vibration free ducts, spinning frame drive systems, nylon gears, relocation of ductwork, relocation of fan and motor housings, wall partition, damping, isolation.
Location: Various plants.
Reference: Textile World, June 1974, page 32 (OSHA Watch).

Description: Shuttleless looms.
Location: "Eva-Jane Plant", Avondale. Sylacauga, Alabama.

Description: Central collection system for spinning and drafting end break waste. Removal of fans and motors. Inverted autoclaves.
Location: "High-Jackson Plant", Avondale Stevenson, Alabama.

## III. CONSIDERATION FOR DUST CONTROL BY VENTILATION IN TEXTILE MILLS USING RAW COTTON DUST

1. Any recirculated air, including the exhaust from the vacuum cleaners, must be of good quality, specifically at or below 0.5 mg/M3 average on a series of samples taken at the air outlet diffusers, or from inside the ductwork, over an 8-hour work shift. The method of sampling is the open-face filter method.
2. The use of compressed air or blowing of air to aid in cleaning rooms, structures, equipment or materials must be eliminated, if feasible. Suction or vacuum removal with well filtered exhaust air. (< .05 mg/M3) is the method of choice for cleaning. If blowing is essential, it can be done in a totally enclosed and exhausted enclosure only. This enclosure can be portable. Blowing may also be done when all other personnel are not working and are to be out for more than 6 hours. Cleaning personnel must wear respirators.
3. The general rule on local exhaust ventilation for enclosed machines is to make all permanent openings as small as possible. Access will still be permissible through hinged or sliding doors, or panels of glass, plastic or metal, with tight closures.
4. Card cleaning or stripping must be done by suction or vacuum. Brushing and suction can be used. Blowing of compressed air should be eliminated, unless there is a well exhausted enclosure in place at the time of blowing.
5. Machinery must not be crowded. Leave plenty of space.
6. General room air exhaust should enter through diffuses near the ceiling and the dust laden air should be taken out through the floor through upward facing grilles, into exhaust ductwork under or in the floor. Material must be stored on pallets and never directly over a return air grille.

7. Air flow should measure 95% or more of the design rated flow, when workers are operating the machinery.
8. Carding is not the only process needing dust control. Bale breaking or opening, picking, drawing, roving, spinning, winding, and any other dust producing operations must be examined for the need of exhaust ventilation or automated handling.
9. There must be no leaks from ducts under positive pressure.
10. Manual doffing of picker laps should be eliminated, where feasible.
11. Use bale opening and breaking machines having local exhaust ventilation, instead of manual breaking and carrying. High speed belts and rolls are a source of dust in the opening or breaking room.
12. Where air must move through doors or from one operation to another, have it move from the cleaner area toward the dustier area. Locate general room air exhaust dust openings or grilles near the base of dusty machines or operations.
13. Respirable dust, for this purpose, is considered to range from 0.5 to 15 microns aerodynamic diameter.
14. Capture velocities must be sufficient to overcome cross currents created by belts, rolls, and other rotating or moving parts.

Description: Multipoint dust pick-ups on cards. Boost air conditioning tonage.
Location: Sycamore Plant – Avondale.
Reference: Textile World, June 1974, page 143

Description: Automated bale openers and bale handling with proper ventilation.
Location: "Parkdale Mill", Gastonia, North Carolina, "New Dawn", Graniteville, South Carolina.
Reference: Textile World, January 1974, pages 40-41

Description: "Blowing off" during plant operation
1. Week-end cleanup, or non-operating times.
2. Vacuum cleaning system.
3. Dust removal ventilation.
4. Machinery slow down.
5. Boost number of air changes.

Location: Various textile mills.
Reference: Textile World, November 1973, page 32.

Description: Hoods for textile dust removal. Recirculation. Warper fronts, quill and bobbin, strippers, drawing fronts, card and picker fronts, card stripper rolls.
Location: Otis Elevator Co., Yonkers, New York
Reference: Textile World, March 1974, page 38

Description: An efficient system for dust removal in fiber areas.
Location: "Linn Mills Co." Landis, North Carolina
Reference: Textile World, 121 (10) 91-92 (1971)