### nova scotia flag

Board Logo

H E R E

***XYZ School***

**Dust Collection System**

**Safety Program**

### 

***Systems Operation Requirements***

***and Log***

**“Binder A”**

**Technology Education Production Lab**

**Room #**

Date: May 2013

**At the beginning of each school year, the classroom teacher will review this manual and acknowledge below:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATE | Name (Print) | Signature | School  Year | Has the Dust Collection System been altered? If yes, note date of the change management form. |
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**Binder A**

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**Dust Collection Systems Program Log**

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# Introduction

The Systems Operation Requirements and Log document has been developed to mitigate the risk of fire and explosion hazards that are inherent with dust collection systems.

The Dust Collection System (DCS) Safety Program is comprised of two binders:

Binder A, “Systems Operation Requirements and Log”

Binder B, “Manufacturers Information and Maintenance Requirements”

These binders were developed jointly with School Programs, Property Services, Health & Safety, Nova Scotia Department of Education and Nova Scotia Fire Marshal’s Office. The DCS Safety program is owned by the Nova Scotia School Fire Safety Committee. Administration of the binder will be the responsibility of the School Board.

Binder A is designed to provide information and a means for appropriate documentation for fire safety, operations and maintenance items related to Dust Collection Systems (DCS) in Nova Scotia schools. Binder B contains reference material related to the specifications and preventative maintenance requirements of the DCS and shop equipment. The information and required documentation will provide boards with a means to achieve compliance with applicable legislation and manufacturers maintenance requirements.

The DCS Safety Program is a regulatory compliance tool for the use and operation of dust collection systems found in Nova Scotia schools. Alternatively, the Nova Scotia Schools Production Technology Curriculum Guide is designed to aid educators in delivering curriculum in a safe and effective manner. It is important to understand the purpose of these two complementary documents and to utilize each appropriately.

The DCS Safety Program includes fire safety components that are part of the schools overall Fire Safety Program. The fire safety component was included in this overall document as a method of keeping the maintenance of this program more practical from the end users point of view. Binders A and B shall be kept in the Technology Production Lab. They must be accessible to school and board staff and outside agencies as required.

Chapter 10 of NFPA 664 requires that an inspection, testing and maintenance program be implemented to ensure that fire and explosion protection systems meet the requirements of NFPA 664. Such a program is required to be documented and detail the equipment inspected, testing performed, test results, and maintenance or repairs carried out.

# Legislative Requirements

As this is meant as an all inclusive document for operations related to the Dust Collection Systems, there are a number of pieces of related legislation that should be acknowledged and referenced as part of this program.

Nova Scotia Education Act

Nova Scotia Occupational Health & Safety Act and applicable regulations

Nova Scotia Fire Safety Act and applicable regulations (June 2011)

National Fire Code (2010)

National Building Code (2010)

NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (2008)

NFPA 68 - Standard on Explosion Protection by Deflagration Venting (2007)

NFPA 69 - Standard on Explosion Prevention Systems (2008)

NFPA 77 - Recommended Practice on Static Electricity (2007)

NFPA 91 - Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids (2004)

NFPA 654 - Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids (2006)

NFPA 664 - Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities (2007)

## Record Retention

All records and documented information for the Dust Collection System and all relevant equipment and training records shall be kept on site for a minimum of **five** years. In addition all work procedures, plans or codes of practice must be kept for a period of two years after the date the procedure, plan or code was revised, replaced or cancelled. Records may be requested for review by an Authority Having Jurisdiction, such as the Office of the Fire Marshal and/or Occupational Health and Safety Division Officer.

## Training

General and system specific training is required for individuals responsible for the safe operation and maintenance of Technology Production labs. Site specific training requirements shall be reviewed each year by the educator responsible for the lab and other relevant employees at the site or board level. Refer to the Training section for details related to training requirements.

# Definition of Terms Relating to Dust Equipment

*The following definitions have been provided by EPM Consulting (2011/2012).*

**Backflow Preventer**

Backflow Preventer.tifThe back flow prevents the fire ball created by the explosion from being transported back along the ducting to the place of work and creating either severe burns to people in the area or a secondary explosion in the work place.

The diverter is a device usually inserted in the exhaust air duct from the space and into the dust collector. It is actuated by the force of explosion through ductwork and moves gravity operated flap to divert the fire ball back to the dust collector.

**NFPA 654** specifies that discharge isolation shall be installed to prevent explosion backflow into the place of work.

**Bag House – Shaker Style**

\\Ricasoffice1\RICAS\Clients\112 NS Government\1103 DOE NS Schools\Dust Collection\Documents in progress\EPM Definitions-Pictures\Bag House-Shaker Style.tifThe bag house is an air filtration device, utilizing fabric filter bags for removing solid particulates from an air stream. Dust particles are transported to the bag house via conveying ducts. As the dust laden air enters the bag house the particles are separated from the air-stream in two ways:

1. The heavier particles fall out of suspension due to the reduced air velocity (*transport velocity failure)* and collect within the bottom of the hopper.
2. The lighter particles are separated from the air-stream as they pass through the filter media.

Since the lighter particles will eventually block the filter media, they are regularly released from the media by shaking.

The system has to be shut down to provide this operation. A rod connects to the bag and is powered by a motor that provides motion to remove the caked on particles. The speed and motion of the shaking depends on the design of the bag and composition of the particulate matter. Though, generally shaking is horizontal. The top of the bag is closed and the bottom is open. When shaken the dust collected on the inside of the bag is set free. During the cleaning process, no dirty gas flows through a bag while the bag is being cleaned.

The bag house used for any flammable or explosive dusts must be located on the outside of the building, in a location where persons cannot be injured from explosion or projectiles generated by an explosion in the dust collector.

*If the cleaning of the dust collector is delayed until the pressure drop rises too high the dust might become imbedded in the media with enough force so that all or part dust would not be ejected during the cleaning (shaking) procedure. This raises the pressure drop and results in reduced flow at much high pressure drop.*

**Blast gates**

\\Ricasoffice1\RICAS\Clients\112 NS Government\1103 DOE NS Schools\Dust Collection\Documents in progress\EPM Definitions-Pictures\Blast Gate.tifBlast gates are a type of sliding gate valves, conveniently located in the ductwork between the hoods and the bag-house to balance the air flow and provide for a smooth transport velocity within the duct work and prevent the settling of the particulates.

These gates are used by the air balancing contractor to ensure the system meets the design.

Each blast gate is placed close to the hood being balanced or near the main ducting branch to balance the leg.

Each blast gate is provided with a means of locking it, once it has been set to prevent tampering.

**Differential Pressure Gauge**

This gauge is mounted on the bag-house and is connected between the high and low pressure sides of the tube sheet inside the bag-house. (clean side and dirty side) The intent of the gauge is to give an optical viewing of the state of the filter media in terms of differential pressure. Low pressure indicates that the dust collector is working according to design, or lower than design may indicate a bag has come loose or is burst, high pressure indicates the filter media is beginning to plug and may need cleaning, inspection is required in both too high or too low cases.

**Ducting**

Inspection Door.tifDucting is the roadway by which the captured dust is transported to the bag-house, it is imperative that the air velocity within the duct from the hood to the bag-house is maintained at the point to which it is designed. (*transport velocity*)

Losses in the ductwork which also affect the dust collection system effectiveness can be attributed to the size and material type of the duct, type and number of elbows, tees, wye branches, valves, bends or any other type of ductwork deviation from the norm. SMACNA codes should be used for all ductwork design.

The ductwork is comprised of all ductwork used for the transportation of both dirty air to the bag-house and clean air from the bag-house, through the fan and release to atmosphere.

The hangers for the duct are also very important to the system design from a standpoint of safety; the hangers should be designed and installed according to the SMACNA codes.

Ducting would not be completed without a system of manually inspecting the ducting for debris and settled dust, for this reason we install inspection doors.

**Exhaust Hood**

The exhaust hood is located at the point or points where dust filled air are released from a machine tool into the ductwork for transportation to the bag-house for separation and collection. The hood must capture the dust emissions in an efficient manner to prevent or reduce worker exposure to dusts.

The exhaust hood:

* Partially (as much as possible) encloses the dust-producing operation.
* Captures dust particles and guides dust-laden air efficiently.

The design of the exhaust hood requires sufficient knowledge of the process or operation so that the most effective hood or enclosure can be installed. (One requiring, minimum exhaust volumes, with desired collection efficiency)

The hood is designed to reflect its ability to capture dust from the source without release to the general atmosphere, the energy necessary to create this force is termed *capture velocity.*

The hood has static losses which contribute to the overall effectiveness of the dust collection system in terms of system pressure drop.

Hoods come in many different shapes and designs depending on the operation, a rule of thumb design for these hoods can be found in the Industrial ventilations manual.

Dust source is to be completed enclosed as possible for hood efficiency to be at its best.

Hoods-2.tif

Examples of exhaust hoods

**Explosion Vents**

Explosion vents or doors are low burst pressure surfaces of calculated area fixed over and opening on the structure to be protected. In the event of a deflagration the vents provide a rapid and unrestricted opening at a predetermined burst pressure (Pstat) allowing combustion gases to expand and flow through the open vent. The required relief area necessary to protect plant or equipment may be determined by using the most current standards of **NFPA 68.**

The explosion vent or relief panel is also a door constructed of various materials, depending on the type of vent being used. The door is normally located in the dirty side of the collector and actuates or is opened by an internal explosion, created within the bag-house; it is also possible that some bag-house manufacturers will design a vent for the clean side in case of bag rupture. The panel (door type explosion vent) is set to either open at a set pressure (Pred), or is set to be blown apart at Pred (panel type explosion vent).

This enables the bag-house to maintain its structural integrity, after a deflagration (explosion). The doors after deflagration can be either reset or replaced depending on the style. Explosion doors and vents must be kept clear at all times and are to be mounted on the bag-house located outside the building or vented to the outside see **NFPA 68.**



Explosion vent examples

**Fan and Motor**

The unit which provides the motive power or energy to enable the dust collection system to operate, is the fan and motor. The fan provides the motive energy to move contaminated air from the dust producing source, to a dust collector.

The principle type of fan used is a centrifugal fan. This type of fan consists of a wheel or rotor, mounted on a shaft that rotated in a scroll shaped housing. Air enters at the center, or eye of the rotor, and makes a right angle turn, and is forced through the blades of the rotor by centrifugal force in to the scroll shaped housing.

The fan and motor are the units which dictate both the capture and transport velocities, bases on the system losses. (static pressure)

**Filter Media**

Woven filters bags are used mainly.

The greatest attention however needs to be paid to the material characteristics which will help determine the air to cloth ratio, which is a measurement of the media efficiency in filtering the air.

The air to cloth ratio is the quantity flow rate of air in cubic feet per minute divided by the area of the filter fabric in square feet. The air to cloth ratio is the largest contributing factor, to the size of the bag-house and consequently the space required for installation.

**Grounding/Bonding**

Static electricity is a common enemy of the dust collection system. Each material has a characteristic that is called the minimum ignition energy (MIE).

This is the minimum amount of energy that is required to ignite the product and cause a potential explosion.

It is necessary to minimize the capability of the system to accumulate static electricity to the point of being able to discharge and create a spark of sufficient intensity to ignite the airborne dust particulates.

Grounding the various parts of the dust collection system with highly conductive wiring to a common ground alleviates the problems concerned, if it is done properly.

It should be noted it is more likely that the static is carried by the product than the conduits. The system should be connected to ground at all parts which are insulated from the next or from the common ground, a wiring diagram should be prepared to ensure that all parts are grounded and these are:

* Hoods, where the dust is introduced in to the system
* Duct work, which carries the product and is subject to static build up from friction.
* Bag-house, which provides for a large conductive area and a location where an explosion is most likely to occur due to the air dust concentration at any one time.
* Filter media, which is contact with the bag-house either directly (tube sheet) or indirectly (shaker mechanism) and has the same likelihood explosion as the bag-house.

It is not normal to ground the clean side since there is not fuel to mix with air unless a bag is burst, but the likelihood of meeting explosions concentrations is very minimal.

Gounding-Bonding.tif

**Level Sensor**

****

This is an electronic measuring device to enable monitoring of the waste level in side the bag-house hopper.

This level monitoring will ensure the waste level does not reach the site of the filter media and explosion vents/panels making them ineffective, or any other safety device within the bag-house. If the level sensor is tripped it will shut the dust collector and fan down.

# Emergency Procedures

1. Press e-stop for equipment.
2. Turn equipment power off and move lever on control panel to the “off” position.
3. Follow School Emergency Procedures.

# Risk Management

Risk Management is a crucial component of all Operations and Maintenance, Fire Safety and Health & Safety programs for organizations. Nova Scotia School Boards recognize technology production labs to be higher risk areas and therefore require specific management plans to reduce risk.

Risk management involves due diligence on the part of all persons. Due diligence is defined as the level of judgment, care, prudence, determination, and activity that a person would reasonably be expected to do under particular circumstances. (CCOHS) In essence we have done everything reasonable in the circumstances to prevent an incident from occurring.

Hazard assessments and log completion are key components to risk management and are required by legislation to be completed.

## Management of Change

NFPA 664 also requires a management of change process whenever a change is made to the dust collection system. The process includes a review of the request by appropriate board departments to help ensure systems are not altered inadvertently and therefore cause operational, fire and/or health & safety concerns. Refer to the Management of Change procedure and form within this binder.

## Procedures for After-Hours Use of the Production Lab/Workshop

Board’s After Hours Use of Facilities procedure requires review and approval of intended use by dedicated individuals, i.e. Principal and/or Board representative. Risk levels within Production Education Labs necessitate more detailed review and training to be completed with the renter/user. This shall include, all system requirements, including operating, maintenance requirements and completion of required documentation (i.e. logs).

The designated board representative shall document and sign off this review with the user/renter prior to the usage agreement commencing.

Any after-hours use of the production education lab area will require specific procedures to ensure all relevant information including safety and maintenance requirements are understood by the renter/user of the facility. Appropriate documentation must also be kept verifying the information reviewed and who the designated responsible person for the area is. The designated responsible person for the area shall have a working knowledge of the equipment use, safety systems within the lab and the school.

## Audits

Periodic audits of the Dust Collection Systems, including documentation, will be completed by the Office of the Fire Marshal and other regulatory bodies.

## Hazard Assessment

Hazard Assessments should be completed at a minimum at the beginning of each school year. If the physical layout and/or processes change, a hazard assessment may be required. A hazard assessment is generally designed to help determine risk levels.

If risk is identified to exist, then the process of attempting to eliminate and/or minimize as far as reasonably possible the level of risk is necessary. The steps involved for this are:

1. Can you eliminate the risk?
2. If you cannot eliminate the risk, are there engineering controls that can help to reasonably reduce the risk? (guards on equipment, dust collection systems)
3. Are there administrative controls that can help to reasonably reduce the risk? (Safe work practices/procedures, maintenance checklists)
4. Is there a need for personal protective equipment? (eye and hearing protection)

For further information refer to the generic Hazard Assessment form in the **Appendix** and the Boards OHS Program.

# General Safety, including Housekeeping

The intent of a wood lab/shop in a school is to teach students hands-on design and problem solving skills utilizing the equipment provided. By far, the most important component is safety. Wood Lab housekeeping is a critical component of safety.

A culture of safety begins from the time the instructor walks into the lab until the last person leaves. It is up to the instructor to ensure the lab and the equipment is safe for use.

In accordance with the Nova Scotia Occupational Health and Safety Act, Occupational General Safety regulations section 24, an employee shall ensure that waste material and debris are removed from a workplace to a suitable disposal area on a regular basis, so as to prevent a hazard.

In accordance with Section 11 of NFPA 664,a documented housekeeping and inspection program is required.

The following are general safety factors that the instructor needs to implement **daily** to maintain a safe shop and good air quality:

**Each Class/Period**

**Cleanliness:** Lab floors and work surfaces need to be clear of wood dust.

**Tidiness:** Tools and equipment need to be stored in proper places.

Walkways are to be kept clear of any slip and trip hazards.

Ensure that all exits are clear, both within and on the exterior of the lab.

Wood needs to be properly (safely) stored.

Projects need to be stored or placed in a safe environment .

**Daily**

**Spark Generation:** Ensure there is no metal grinding, welding, soldering, or other spark producing equipment in the wood lab/shop. [NFC Sentence 5.3.1.10(1)]

Any metal collected through the cleanup process shall be separated from wood debris or combustible waste to prevent entry into the dust-collecting system.

Circuit breaker boxes should be kept securely closed at all times.

**Dust Extract:** Ensure the dust extraction system (main dust collector or portable dust collector) is connected to each machine to be used and blast gates have not been altered.

Check to see if central dust collection barrels need to be emptied.

Check filters and barrels in portable dust collectors/vacuums and empty dust so that the bin is never more than 2/3 full. Empty at intervals not less than once per week.

Check filters in ceiling mounted air filtration units for dust accumulation.

There shall be no storage of materials or other equipment inside the fenced blast area for the dust collector.

Equipment shall be maintained and operated in a manner that minimizes dust particulate in the air and/or on surfaces around equipment.

**Mechanical/Electrical:** Check cord for frays and wear. Cords caps are to be in place and in usable condition (not tampered with, removed, visibly damaged, etc.). Extension cords are not to be used as permanent electrical connections.

All equipment guards, tool rests, collection hoods, and belts, are in place and in good condition.

**Shop Vacuums:** Empty collected material from stand-alone shop vacuum.

Check filters in portable vacuum, overhead air cleaner, shop vacuum, etc. to ensure they are clean and functional. Clean as per manufacturers’ recommendations.

**Removal of dust:** Surfaces shall be cleaned in a manner that minimizes the generation of dust clouds. Blowing down with compressed air is not permitted.

Emptying of portable systems shall be carried out as often as necessary, depending on the dust generated, and properly disposed of.

**Combustibles:** Remove wood waste, including dust, in order to prevent these materials from accumulating outside, on, or around operating equipment or otherwise within the facility.

Other combustible waste, including rags shall be placed in covered metal receptacles until removed to a safe place for daily disposal.

Flammable liquids shall be safely handled and stored in a secured cabinet as per the National Fire Code (latest edition) and School Board policy.

# Dust Collection Drawings and Commissioning Information.

In accordance with the Nova Scotia Office of the Fire Marshal, the shop general arrangement dust collection system drawing is posted within the lab. A copy of this drawing is found in the Appendix.

A copy of the DCS commission information/documents are found in the Appendix of this document. This commission information is to include a copy of the drop flows (balancing diagram).

# Lockout/Tag-out Procedure

The Nova Scotia Occupational Health and Safety Act, Occupational General Safety Regulations, Part 6 – LOCK OUT, sections 51 – 54 stipulate the legislated requirements for lockout. This will be applied, but not limited to cleaning, maintenance, and out of service equipment.

Please refer to the applicable school board lockout tag-out procedure. This section could include any training tools and documentation for school or Board specific information.

# Hot Work Permit Procedure

In accordance with NFPA 664:

8.2.2.1.2\* *Woodworking pneumatic conveying systems shall be restricted to handling wood residues; under no circumstances shall another operation that generates sparks, such as from grinding wheels, or flammable vapors, such as from a finishing operation, be connected to a woodworking pneumatic conveying system {ductwork}.* **This may result in a fire or explosion.**

Technology labs occasionally use grinders to sharpen tools. Such grinders must be located in a room separate from the technology production lab.

Please refer to the applicable school board hot work permit procedure.

# Dust Collector Start Up / Shut Down

See the information sheet provided in the Appendix of this document. A copy of this information sheet is to be posted at the DSC control panel.

# Management of Change

This applies only to**equipment connected to the dust collector on a permanent basi**s.

Section 4.3 of NFPA 664 requires a *change management process* whenever a change is made involving materials, technology, equipment, procedures and facilities. For school wood labs, the most likely change will be the replacement or perhaps the addition of equipment in the lab. All changes of dust collector connected equipment or procedures must be initiated (prior to purchase/install) with the completion of the form in the Appendix.

**Completing the form:** All **5** steps of the Change Management Form are to be completed in sequence, including appropriate signatures, prior to equipment purchase approval and installation approval.

The following must be documented:

1. What is to be changed and why, including what equipment or procedures will no longer be required and what new equipment and procedures will be implemented.
2. Whether the change is temporary (including length of time) or if the change is permanent.
3. What operational changes will be necessary with the implementation of the change, including power requirements, dust extraction, room ventilation or balancing, and space requirements.
4. What maintenance requirements will change with the implementation of the change.
5. Obtain signature approval of the school principal, program department consultant/facilitator, board maintenance supervisor, and Fire Manual responsible person(s). Maintenance supervisor or appropriate staff to ensure that qualified technical advice is obtained where warranted (NFPA 664 section 4.4). (This would include ensuring the dust collection system can accommodate the new equipment, checking/balancing/rebalancing of the dust collection system, duct design, grounding/bonding requirements, dust capture hoods, etc.)
6. The Board shall revise the O&M Manual for the lab upon approval of the change documentation.
7. Appropriate Board departments shall update any posted documentation for the lab which may have changed (i.e. equipment layout, CFM requirements, etc.).
8. Provide training to anyone affected by the change including users of the equipment and maintainers of the equipment.

**NOTE: Teacher is responsible to develop and include equipment maintenance form in the appropriate manual for recording of servicing etc.**

# Training/Professional Development

Every teacher, custodian, and central maintenance person **must** be trained in their respective responsibilities for the safe operation and maintenance of the technology education labs. Section 10.4 of NFPA 664 sets out training requirements that should include general safety training and job-specific training.

It should be noted that the school and/or the Board policies and procedures should be referenced regarding general safety training.

***General safety training*** should ensure that employees are knowledgeable of the following:

1. General lab safety rules
2. School Emergency Response Plans (including evacuation and relocation plans)
3. Procedure for reporting an accident (SIP Forms) or unsafe conditions
4. Housekeeping practices. Refer to “Housekeeping Procedures” for detailed information.
5. Basic personal protective equipment requirements
6. Location of safety supplies.
7. Emergency procedures.
8. The necessity for proper functioning of dust collector related fire and explosion protection systems and their location
9. Identifying hazardous situations

Technology Education Production Lab/Workshop Training shall ensure that teachers and/or maintenance staff are knowledgeable about the following:

1. Training specific to the dust collection system shall be provided to all employees working in the related environment
2. The hazards of their working environment related to the dust collection system and their behavior and procedures as outlined in the school emergency evacuation procedure
3. The necessity for proper functioning of related fire and explosion protection systems that are under their responsibility
4. Equipment maintenance requirements and practices
5. Lockout/tagout procedures
6. Safe handling, use, storage, and disposal of hazardous materials used in the lab
7. The location and operation of fire protection equipment, manual pull stations and alarms, emergency phones, first aid supplies, and safety equipment
8. Equipment operation, safe startup and shutdown, inspection, clean-out, and response to abnormal conditions
9. The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely
10. The roles of all individuals responsible for the lab
11. Pressure relief device(s) location, vent relief path, other hazardous areas and maintenance requirements and practices
12. School board “hot work procedures” (welding, metal cutting, grinding, etc) shall not be done. Procedures may be developed and approved by the Office of the Fire Marshal.
13. Use of and requirements for Management of Change process

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# Documentation of Training Specific to Dust Collectors

Personnel responsible for maintaining the Dust Collection System using a device for venting of deflagrations shall receive initial and refresher training, in accordance with NFPA 68 section 11.10. All teaching staff shall review the contents of Binder A and Equipment Maintenance Operation Manual annually, at the beginning of the school year, and document appropriately. Training records must be maintained for employees carrying out work on such dust collection systems. Training shall include:

(1) Hazards of their workplace

(2) General orientation, including safety rules

(3) Process description

(4) Equipment operation, safe startup and shutdown, and response to upset (abnormal) conditions

(5) The necessity for proper functioning of related fire and explosion protection systems

(6) Pressure relief device(s) location, vent relief path, and maintenance requirements and practices

(7) Housekeeping requirements

(8) Emergency response and egress plans

|  |  |  |
| --- | --- | --- |
| **Employee Name** | **Date of Training** | **Details of Training Received** |
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# Appendix

1. Change Management Form
2. Hazard Assessment Form
3. Dust Collector Start-up/Shut Down Reminders
4. Close-out/ Commissioning Report
5. Index Plans

***Change Management Form***

*This form is to be used whenever a new dust producing machine is added or removed from the Main Dust Collector in the Technology Education Lab and/or if a blast gate is to have its position changed.*

1. **To be completed by the Teacher**

School: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [Full Name of School]

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [Day/Month/year]

What is being changed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Replacement of existing machine (attach proposed manufacturers details);
* Other (attach proposed details);
* Request to add a machine, duct, and blast gates.

**Note: Attach a report on this provided by board maintenance. Any design must be carried out by a qualified engineer.**

Why is this change required?

* Program delivery
* Replacement of Equipment
* Other, please describe in detail \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is this change: € permanent € temporary (if so how long): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CFM Calculations:** Reference Kraemer Sheet

Dust Collector CFM (design):\_\_\_\_\_\_\_\_\_\_\_

Obsolete Equipment CFM: \_\_\_\_\_\_\_\_\_\_\_\_\_

New Equipment CFM: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

New Total CFM: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Recommend to not exceed 90% of installed DCS CFM)

**Electrical Information:**

Obsolete Equipment Amps: \_\_\_\_\_\_\_\_\_\_\_\_

Obsolete Equipment Phase: \_\_\_\_\_\_\_\_\_\_\_\_

New Equipment Amps: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

New Equipment Phase: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

New Equipment HP:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Submitted: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher/Change Requestor (name, signature, and date)

**2. To be completed by the Principal**

Is the change approved? Yes\_\_\_ No\_\_\_\_

Principal Approval: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Principal (name, signature, and date)

**3. To be completed by Program Department Consultant/Facilitator (refer to Board responsibility)**

Are revisions to the lab O&M Manual required?

€ No € Yes (Cleaning Procedures, Maintenance Procedures)

If yes, please describe: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What training will need to take place:

€ Equipment € Procedural

Date and Scope of training: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Program Consultant or Program Dept. Responsible Person (name, signature, and date)

**4. Operations/Property Services**

**€** Requires changing position of a blast gate(s) and system rebalancing (attach proposed details)?

€ Requires modifying/adding duct work (attach proposed details)?

€ Electrical changes (attach proposed details)?

€ Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Maintenance/Installation approved?

€ Yes € No

Operations/Property Services approval: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Operations/Property Services (name, signature, and date)

**5. Fire Safety Updates:**

*Changes to a dust collector “system” may require revisions to the site specific Fire Safety Requirements.*

Are changes to Fire Safety Plan required?

€ No € Yes

If yes, please describe: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Does the Dust Collector Floor Plan need to be updated?

Date Completed and sent: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Changes to Fire Safety requirements (logs) must be communicated to Principal, “shop” teacher, and custodian/caretaker. Training may be required.**

Approval: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Board person responsible for Fire Safety updates (name, signature, and date)

**NOTE: All (5) signatures above are required prior to purchase and installation of equipment.**

**NOTE: This form shall be kept available for review by the Authority Having Jurisdiction.**

**NOTE: Teacher is responsible to add the new machine manufacturer’s maintenance and operation manuals to the appendices of the appropriate manual.**

**NOTE: Teacher is responsible to develop and include equipment maintenance form in the appropriate manual for recording of servicing etc.**

**Hazard Assessment Form – Technology Education Production (Wood) Shop**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date of Assessment:** |  | **Applicable to all school wood shops** | |
| **School Year:** | *20## / 20##* | **Name of School:** | *School Name* |
| **Instructor(s) Signature(s):** | *Signature and date* | *Signature and date* | *Signature and date* |

DCS = Dust Collector System (collector/vacuums/collected dust/ducting/blast gates/deflagration points/backflow preventer/dust hoods

Staff: exposure in working shop may be up to 5hrs per work day. Students: exposure in working shop may be up to 1.5hrs per work day

|  |  |
| --- | --- |
| Risk **Risk (Consequence) Assessment:**   1. No evident risk 2. Slight to moderate risk – could result in non-serious injury, illness or minor property damage 3. Serious risk – could result in injury, serious illness or property damage 4. Severe risk – could result in death, severe injury or illness | **Probability (Likelihood) Rating:**   * 1. Unlikely to occur   2. Possibly will occur in time   3. Probably will occur in time   4. Likely to occur immediately or within a short period of time when staff or students could be exposed |

**Priority Ranking (Hazard Rating):**

*Multiply* Risk Assessment factor by the Probability Rating factor – any hazard with a priority rating above **10** must have controls put in place **immediately** by the JOHSC.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Items** | **Area** | **Risk Assessment** | **Probability Rating** | **Priority Rating** | **Hazard Controls – Administrative, Engineering,**  **Personal Protective Equipment, Safe Work Practices,**  **Job Procedures** |
| 1a dust (in air or accumulated) | Suspended (respiratory) | 1 | 1 | 1 | With proper dust hoods at machine, DCS operational, balanced and properly maintained there is minimal risk of dust inhalation. Where dust producing activities occur away from a dust hood then dust masks must be worn. |
| 1b | Accumulated (explosivity) | 3-4 | 2 | 6-8 | Accumulated dust will possibly occur in DCS bags, barrels, ducts, equipment housing or on high/inaccessible surfaces. Documented regular inspections and maintenance will control the probability. |
| 2 moving parts | Powered tools / machinery | 3 | 2 | 6 | All machines are to have proper guards in place and I use. Long hair, jewellery and loose clothing shall be constrained. LOTO procedure to be followed prior to equipment maintenance/blade change etc. |
| 3 noise | Shop, dust collector, planer | 2 | 2 | 4 | DCS creates a noisy environment. Planer and other equipment are noisy. Noise induced hearing loss is preventable. Limit time in shop, turn DCS of when possible, wear hearing protection. |
| 4 hands (splinters, contact with sharps, moving objects) | Handling wood | 2 | 3 | 6 | Care when selecting and handling wood. Gloves may be beneficial when moving many pieces. Push pads should be used when pushing wood near cutting blades. |
| 5 energy sources (contact, LockOTO) | Electrical motors, electricity | 4 | 2 | 8 | Electrical current may kill. Equipment incidentally activated during maintenance may result in serious injury or damage. Lock Out Tag Out procedure is to be posted, communicated and followed. |
| 6 other persons in shop | Work space | 2-3 | 2-3 | 4-9 | Horseplay, inattention, traffic, large pieces and undefined operator-only areas are some factors that may possibly or probably lead to incidents. Administrative controls and safe work practices are to be taught and adhered to at all time. |
| 7 lack of knowledge/ inexperience | Shop | 2-3 | 2-3 | 4-9 | Many students are new to the environment and the equipment and thus a liability. Lessons, demonstrations, documented training and demonstration of knowledge of safe work procedure are to be completed before supervised use of each individual piece of equipment. |
| 8 sparks / hot work | Environments containing dust | 2-3 | 2 | 4-6 | Any type of hot work may cause ignition of suspended or accumulated dust or wood products. Care to be taken to avoid metal/nails etc. from entering DCS. |
| 9 Housekeeping | Floors and work surfaces, wood and tool storage | 2-3 | 2 | 4-6 | Housekeeping issues will possibly occur within the duration of classes/a day. Dusting, sweeping and general clean-up on a class by class basis are best control measures. Order must be maintained in tool and wood storage areas to minimize risks. Disorder and overstocked wood storage areas increase risk. |
| 10 after school usage | Persons other than T.E. Instructor(s) | 2-3 | 1-2 | 2-6 | After hours privileges to any non-curriculum related persons or activities should be forbidden by School Administration. Tampering or damage may occur and not be reported. |
| 11 |  |  |  |  |  |
| 12 |  |  |  |  |  |
| 13 |  |  |  |  |  |
| 14 |  |  |  |  |  |
| 15 |  |  |  |  |  |

**Dust Collector Start up / Shut Down REMINDERS**

Consider the following at start up and shut down:

**Pre Startup - OUTDOOR**

|  |  |
| --- | --- |
| * Ensure no loose debris or stored materials inside fenced area | * Observe for new damage or tampering to system |
| * Observe dust collection barrels properly in place and attached | * Observe magnehelic pressure gauge, if possible |
|  | * Advise any persons near fenced area |

**Pre Startup – INDOOR**

* Dust ports at machine connections be inspected for blockages
* Access & egress are unobstructed
* ALL emergency stops are readily accessible
* Equipment surfaces free of loose materials
* Advise class personnel of start-up
* Personal Protective Equipment is available (hearing protection/eye)

**After Start-up**

* Listen to the system for abnormal sounds
* Observe magnehelic pressure gauge

**Shut Down**

* Advise class personnel of shut down
* Turn off all dust producing equipment
* Listen to ensure bag shaker functions (up to 5 minutes)

Always review the maintenance and operating manuals for your equipment. **Complete inspection logs as per required frequency**. Cold and freezing weather conditions may require more time to complete this check and for the

system to reach normal operating functions.