50 Years of Quality

Specifying a Dust Collector For a School Wood Shop

5/1/2007

A Properly Designed and Maintained Dust Collection System Will

- **Improve shop safety**
- **Reduce dust inhalation**
- **Reduce a potential fire hazard**
- **Prevent dust from drifting out of the wood shop**
- **Encourage good industrial practices**
- **Conserve conditioned air, if air is recirculated**

The Five Components of a Dust Collection System Are

- **Hood to confine the dust at its source**
- **Duct system to convey the dust**
- **Fan to provide necessary suction in the hoods and maintain the transport velocity in the ducts**
- **Collector to separate the dust from the air stream**
- **Device to store the collected dust**

Specifying a Dust Collector for a School Wood Shop

Equipment Choices

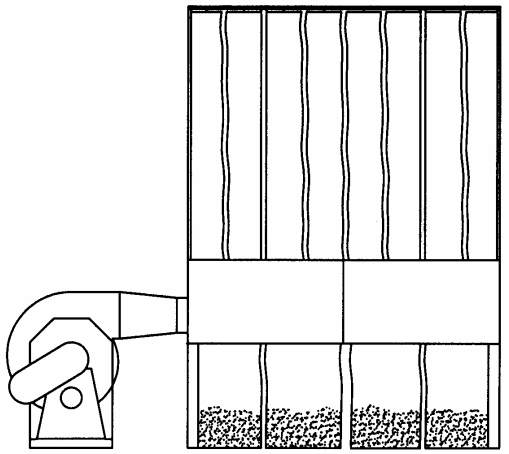
Model/Description	Location	Initial Cost	Maintenance Cost	Energy Consumption	Sound Level	Comments
1. PPO Enclosureless Positive Pressure	Indoors	Low	Moderate	Moderate	75-85	Typically used in small commercial shops. Requires floor space.
2. CY Cyclone exhausting outdoors with discharge silencer	Outdoors	Low	Low	High	80-85	Lowest initial cost for a central system. Least maintenance, but loss of heated air.
3. CY & AF Cyclone returning air to building with silencer and indoor filter bags	Outdoors/ Indoors	Low	Moderate	High	75-85	Dust must be removed from both cyclone & filters. Requires space for indoors filter.
4. CY & AF Cyclone returning air to building with silencer and outdoor filter bags	Outdoors	High	Moderate	High	75-85	Dust must be removed from both cyclone & filters. Requires large concrete pad.
5. CCP Jet Pulse Filter Bag Type	Outdoors	High	Moderate	Moderate	80-85	Typically for production operations. Requires 100 PSI compressed air. Very tall. Rarely used for school wood shops.
6. SPV/SPH Jet Pulse Filter Cartridge (STERNPULSE)	Outdoors	High	Moderate	Moderate	80-85	Typically for production operations. Requires 100 PSI compressed air. Rarely used for school wood shops.
7. DGH Shaker Cabinet soft filter type	Indoors	Moderate	Moderate	Moderate	70-75	Ideal for 2-3 machines. Manual shaker. Very compact.
8. DK/DM Shaker Cabinet rigid filter type (VIBRACLEAN)	Outdoors	High	Low	Low	70-75	Best all-around unit for a school. Multi-pocket filters. Automatic shaking. Factory wired. High efficiency quiet BI blower. 55-gal drum dust storage.
Note: Consult with IMC, IFC and NFPA 664 for fire safety requirements						Revised 5/1/2007

Equipment Choices

1. Enclosureless Positive Pressure

Location: Indoors
Initial Cost: Low
Maintenance Cost: Moderate
Energy Consumption: Moderate
Sound Level: 75-85

- **Typically used in small commercial woodworking shops**
- **Dust is stored in easy to dispose of plastic bags**



Equipment Choices

2. High Efficiency Cyclone Exhausting Outdoors with Discharge Silencer

Location: Outdoors

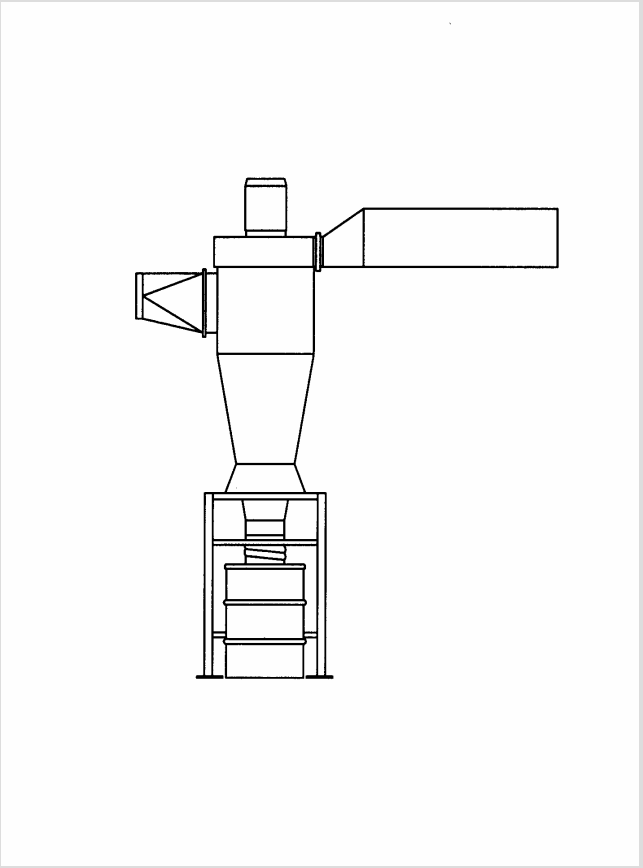
Initial Cost: Low

Maintenance Cost: Low

Energy Consumption: High

Sound Level: 80-85

- **Lowest initial cost**
- **Least maintenance, but loss of heated air**



Equipment Choices

3. High Efficiency Cyclone Returning Air to Building with Silencer and Indoor Filter Bags

Location: Outdoors/Indoors

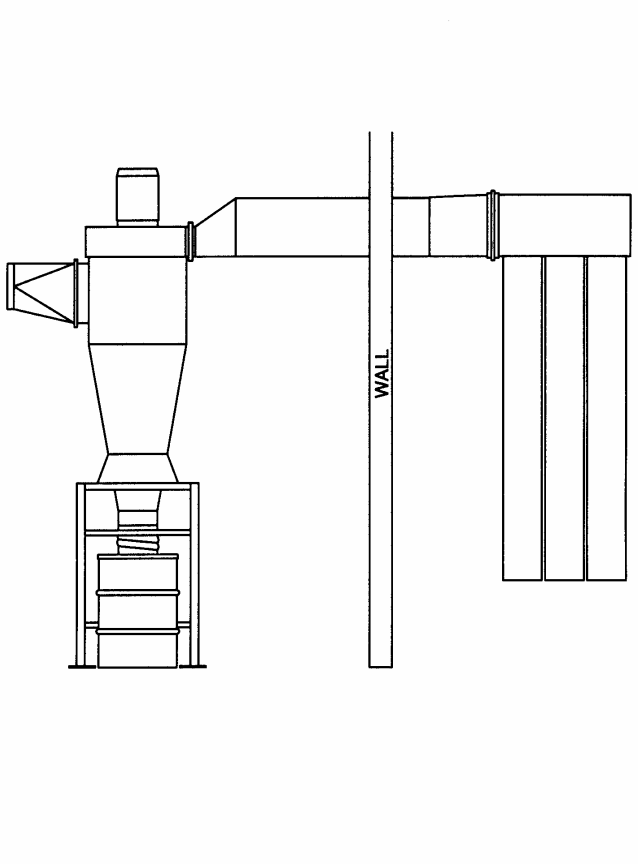
Initial Cost: Low

Maintenance Cost: Moderate

Energy Consumption: High

Sound Level: 75-85

- **Low initial cost**
- **Requires space indoors for filters**



Equipment Choices

4. High Efficiency Cyclone Returning Air to Building with Silencer and Outdoor Filter Bags

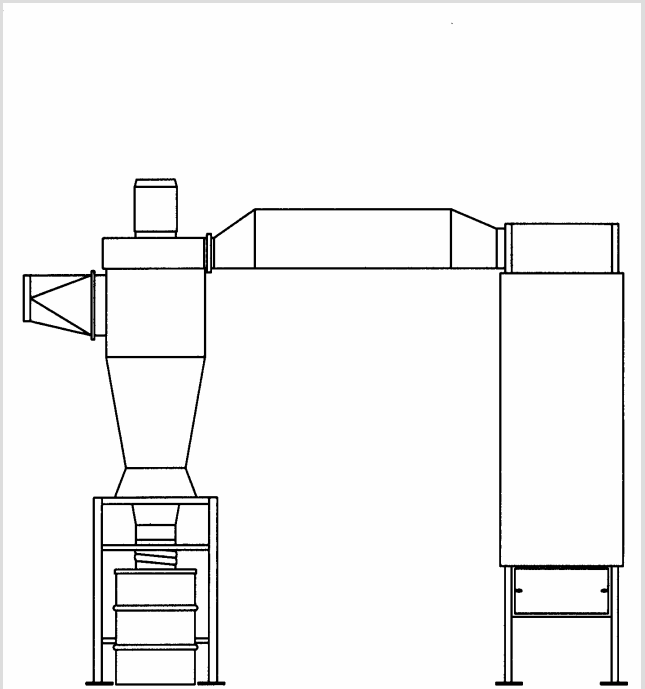
Location: Outdoors

Initial Cost: High

Maintenance Cost: Moderate

Energy Consumption: High

Sound Level: 75-85



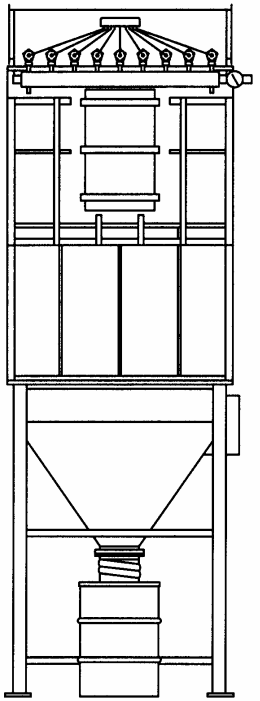
- **Popular arrangement**
- **Requires large concrete pad**

Equipment Choices

5. Jet Pulse Filter Bag Type

Location: Outdoors
Initial Cost: High
Maintenance Cost: Moderate
Energy Consumption: Moderate
Sound Level: 80-85

- **Typically for production operations**
- **Requires 100 psi of compressed air**
- **Very tall**
- **Rarely used for schools**

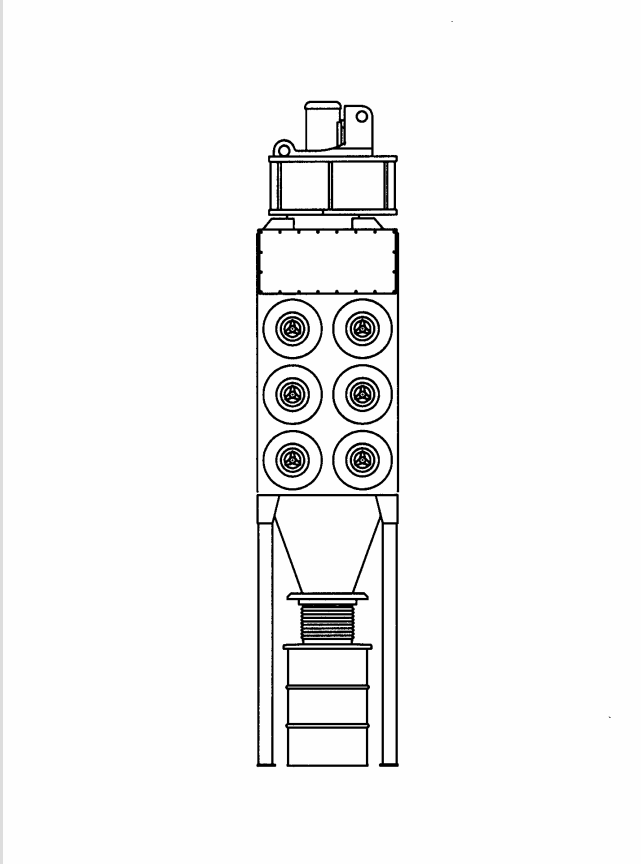


Equipment Choices

6. Jet Pulse Filter Cartridge Type

Location: Outdoors
Initial Cost: High
Maintenance Cost: Moderate
Energy Consumption: Moderate
Sound Level: 80-85

- **Typically for production operations**
- **Well suited for wood cutting and sanding dust**
- **Requires 100 psi of compressed air**
- **Rarely used for schools**

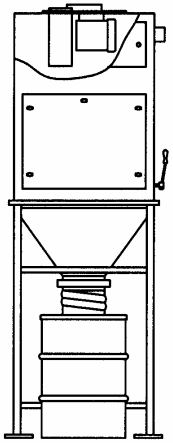


Equipment Choices

7. Shaker Cabinet Soft Filter Type

Location: Indoors
Initial Cost: Low
Maintenance Cost: Moderate
Energy Consumption: Moderate
Sound Level: 70-75

- **Suitable for shops with 2-3 machines**
- **Very compact**
- **Manual shaker**
- **Drum style is best**

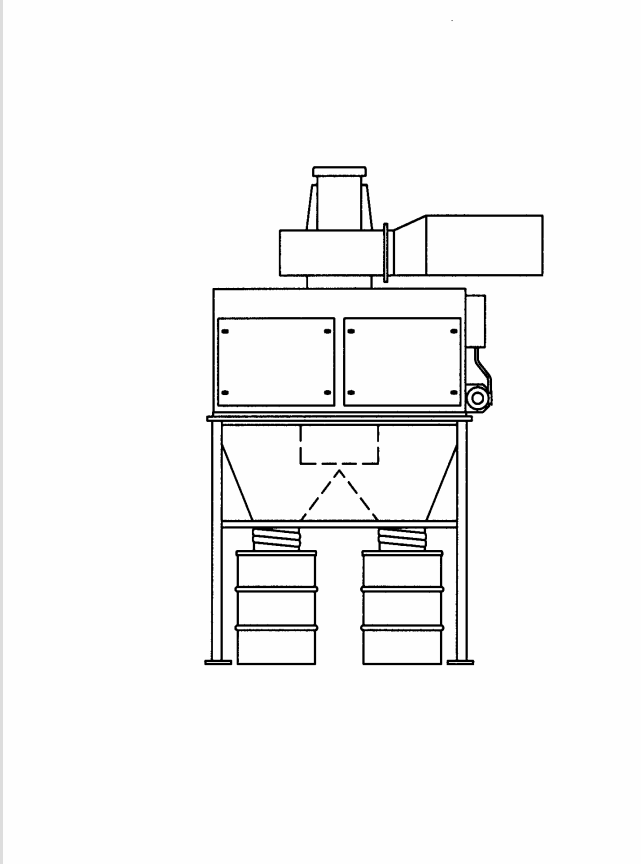


Equipment Choices

8. Shaker Cabinet Rigid Filter Type (VIBRACLEAN)

Location: Outdoors
Initial Cost: High
Maintenance Cost: Low
Energy Consumption: Low
Sound Level: 70-75

- **Best all around unit for a school**
- **Excellent filter spacing and shaking**
- **High efficiency quiet BI blower**
- **Factory wired**
- **Multiple 55-gallon drum storage**



Designing a System

1. **Determine the air flow required to exhaust each woodworking machine as shown on the EXHAUST REQUIREMENT chart.**

2. **Add up the exhaust requirement for all machines to operate simultaneously. Verify that all machines are average size and none is over size.**

3. **Decide with owner if design should be for 80%, 100% or 120%. Multiply this factor by the total from step#2. (NFPA 664 recommends that design should be for a minimum of 100%)**

4. **Determine location of woodworking machines.**

5. **Determine location of dust collector. Outdoors is preferred for noise and safety reasons. If located indoors, either an explosion vent ducted to the outdoors or an explosion suppression system is required per NFPA 664.**

Designing a System

6. **Decide if air will be recirculated. Some states require a spark detection system, per NFPA 664.**

7. **From above parameters determine CFM capacity required for dust collector. For recirculation of air consider a VIBRACLEAN. For no recirculation consider a cyclone with a discharge silencer.**

8. **Verify with owner that 55 gallon drums will be sufficient and can be handled easily. If a Vo-Tech school, a rotary airlock discharge and dumpster should be considered, instead of drums. If much planing is done, a cyclone and airlock should be used.**

9. **Using a layout of machines and location of dust collector, design duct work with shortest run and minimal direction changes. Maintain a velocity of 4,000 ft/minute in the main line and branches.**

10. **Determine the static pressure required for the duct work at the velocity of 4,000 ft/min.**

Designing a System

11. **Add the resistance of the entrance loss, dirty filters, return duct and possible safety monitoring filters to the duct resistance from step 10.**

Allow 2” SP for Duct entrance loss	**__2__**
Allow 2” SP for dirty filters*	**_____**
Allow 1” SP for return duct*	**_____**
Allow 1” SP for safety filter*	**_____**
Insert SP for ducts from step #10	**_____**

TOTAL EXTERNAL STATIC PRESSURE=_____

*** if applicable**

12. **Select a dust collector model that meets or slightly exceeds the air flow and external static pressure that was determined from the previous steps.**
13. **Consider a separate small indoor dust collector if there is one machine that is very far from the other machines.**

Designing a System

14. **Wood dust that is 420 microns and smaller is combustible and potentially explosive. Therefore an explosion relief vent in the dust collector should be considered. Compliance with NFPA 664 may require spark detection and suppression system with abort damper. Sometimes local codes do not allow recirculation of the air.**

15. **If desired, an indoor 95% safety monitoring filter can be included in systems that are designed for recirculation.**

16. **Consider a ceiling hung filter media air cleaner if there will be hand sanding.**

17. **Write the specification and schedule based on the typical specification format found in the STERNVENT catalog. Request an autoCAD drawings and Microsoft Word specification from your sales representative or Peter Levitt -- plevitt@sternvent.com.**

18. **For assistance contact either your local STERNVENT sales representative or call STERNVENT at 1-800-383-dust. We look forward to working with you.**

Exhaust Requirements

Equipment	Size	CFM	Branch Size
Table Saw	up to 12” dia.	350 or 550	4” or 5”
Radial Saw	up to 12” dia.	350 or 550	4” or 5”
Band Saw	½” wide blade	350	4”
Disc Sander	up to 12” dia.	350	4”
Belt Sander	up to 6” wide	550	5”
Jointer	up to 6” wide	400	4”

Exhaust Requirements

Equipment	Size	CFM	Branch Size
Shaper	**up to 1 hp**	**350**	**4”**
Planer*	**up to 20” wide**	**800**	**6”**
Lathe		**use a floor sweep****	
Drill Press		**use a floor sweep****	

***** A planer can fill a 55-gallon drum in 20 minutes. Shops that use a planer for more than 1 hour per day have special design considerations.

**The floor sweep is typically a 6” dia. branch which is closed when not in use and therefore not included in computing total air volume.

Duct Sizes at 4,000 Ft/Minute

For CFM	200	350	800	1,100	1,400	1,800	2,200
Use Duct Size of	3”	4”	5”	7”	8”	9”	10”

For CFM	2,600	3,100	3,700	4,300	4,900	5,600	6,300	7,100
Use Duct Size of	11”	12”	13”	14”	15”	16”	17”	18”

For CFM	7,900	8,700	9,600	10,600	11,500	12,500	13,600	14,700
Use Duct Size of	19”	20”	21”	22”	23”	24”	25”	26”

Sternvent Clears The Air

Job: Milton Hershey School

Location: Hershey, PA

Application: Woodworking

Model: CYLK4440

Air Flow: 8,500 CFM

Sternvent Clears The Air

Job: Spencerport BOCES

Location: Spencerport, NY

Application: Woodworking

Model: (2) DKLD48010

Air Flow: 3,800 CFM each

Sternvent Clears The Air

Job: West Lake Middle School

Location: West Lake, NC

Application: Woodworking

Model: CYD3010

Air Flow: 3,500 CFM

Sternvent Clears The Air

Job: Lincoln Middle School

Location: Passaic, NJ

Application: Woodworking

Model: DKLD48015

Air Flow: 4,800 CFM

Sternvent Clears The Air

Job: William Patterson University

Location: Wayne, NJ

Application: Woodworking

Model: DKPD72015

Air Flow: 5,700 CFM

Sternvent Clears The Air

Job: Gloucester HS

Location: Gloucester, MA

Application: Woodworking

Model: CYLK4450

Air Flow: 10,000 CFM

Sternvent Clears The Air

Job: Bergen County Maintenance

Location: Hackensack, NJ

Application: Woodworking

Model: DKPD24405

Air Flow: 2,400 CFM

Sternvent Clears The Air

Job: New Oxford Middle School

Location: New Oxford, PA

Application: Woodworking

Model: DKLD48015

Air Flow: 8,500 CFM

TEN THINGS TO AVOID
When Designing a Dust Collection System

1. Do not mix wood dust and metal grinding.

   The sparks from grinding will ignite the wood dust and may cause an explosion.

2. Do not specify an explosion-proof motor unless there is a hazardous environment.

   Rarely are explosion-proof motors required or recommended for dust collectors or woodworking machines.

3. Do not use PVC ducts.

   Static electricity is generated, which can cause an explosion, and there is a poor selection of elbows and fittings.

4. Avoid dust collectors that store the dust in a built-in drawer or hopper.

   The air will continue to blow the dust back up the filters, making the shaker ineffective. Use funnel style with drum(s) and no side gate.

5. Do not include the floor sweeps in the air requirements.

   The floor sweeps should have a door or slide gate that is normally kept closed until the machines are off.

6. Do not design a system without confirming with the shop teacher the amount of wood waste produced per day.

   A planer can fill a 55-gallon drum in 20 minutes. Shops that use a planer for more than 1 hour per day have special design considerations.

7. Do not use a cyclone without a silencer.

   The cyclone itself is very noisy.

8. Do not over design a system.

   A dust collector that is grossly over-sized will result in excessive noise due to the high velocity in the ducts.

9. Do not specify a unit without requesting a digital drawing and specifications.

   We want the drawing and specification to complement each other instead of contradicting.

10. Do not specify a shaker cabinet unit and then list a cyclone model in the schedule.

    This will result in confusion.

50 Years of Quality

Specifying a Dust Collector For a School Wood Shop