Specifying a Dust Collector
For a School Wood Shop
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

<table>
<thead>
<tr>
<th>Model/Description</th>
<th>Location</th>
<th>Initial Cost</th>
<th>Maintenance Cost</th>
<th>Energy Consumption</th>
<th>Sound Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PPO Enclosureless Positive Pressure</td>
<td>Indoors</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>75-85</td>
<td>Typically used in small commercial shops. Requires floor space.</td>
</tr>
<tr>
<td>2. CY Cyclone exhausting outdoors with discharge silencer</td>
<td>Outdoors</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>80-85</td>
<td>Lowest initial cost for a central system. Least maintenance, but loss of heated air.</td>
</tr>
<tr>
<td>3. CY &amp; AF Cyclone returning air to building with silencer and indoor filter bags</td>
<td>Outdoors/Indoors</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>75-85</td>
<td>Dust must be removed from both cyclone &amp; filters. Requires space for indoors filter.</td>
</tr>
<tr>
<td>4. CY &amp; AF Cyclone returning air to building with silencer and outdoor filter bags</td>
<td>Outdoors</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
<td>75-85</td>
<td>Dust must be removed from both cyclone &amp; filters. Requires large concrete pad.</td>
</tr>
<tr>
<td>5. CCP Jet Pulse Filter Bag Type</td>
<td>Outdoors</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>80-85</td>
<td>Typically for production operations. Requires 100 PSI compressed air. Very tall. Rarely used for school wood shops.</td>
</tr>
<tr>
<td>6. SPV/SPH Jet Pulse Filter Cartridge (STERNPULSE)</td>
<td>Outdoors</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>80-85</td>
<td>Typically for production operations. Requires 100 PSI compressed air. Rarely used for school wood shops.</td>
</tr>
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</table>

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 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.
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

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Size</th>
<th>CFM</th>
<th>Branch Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table Saw</td>
<td>up to 12” dia.</td>
<td>350 or 550</td>
<td>4” or 5”</td>
</tr>
<tr>
<td>Radial Saw</td>
<td>up to 12” dia.</td>
<td>350 or 550</td>
<td>4” or 5”</td>
</tr>
<tr>
<td>Band Saw</td>
<td>½” wide blade</td>
<td>350</td>
<td>4”</td>
</tr>
<tr>
<td>Disc Sander</td>
<td>up to 12” dia.</td>
<td>350</td>
<td>4”</td>
</tr>
<tr>
<td>Belt Sander</td>
<td>up to 6” wide</td>
<td>550</td>
<td>5”</td>
</tr>
<tr>
<td>Jointer</td>
<td>up to 6” wide</td>
<td>400</td>
<td>4”</td>
</tr>
</tbody>
</table>
Exhaust Requirements

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Size</th>
<th>CFM</th>
<th>Branch Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaper</td>
<td>up to 1 hp</td>
<td>350</td>
<td>4”</td>
</tr>
<tr>
<td>Planer*</td>
<td>up to 20” wide</td>
<td>800</td>
<td>6”</td>
</tr>
<tr>
<td>Lathe</td>
<td></td>
<td></td>
<td>use a floor sweep**</td>
</tr>
<tr>
<td>Drill Press</td>
<td></td>
<td></td>
<td>use a floor sweep**</td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>For CFM</th>
<th>200</th>
<th>350</th>
<th>800</th>
<th>1,100</th>
<th>1,400</th>
<th>1,800</th>
<th>2,200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Duct Size of</td>
<td>3”</td>
<td>4”</td>
<td>5”</td>
<td>7”</td>
<td>8”</td>
<td>9”</td>
<td>10”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For CFM</th>
<th>2,600</th>
<th>3,100</th>
<th>3,700</th>
<th>4,300</th>
<th>4,900</th>
<th>5,600</th>
<th>6,300</th>
<th>7,100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Duct Size of</td>
<td>11”</td>
<td>12”</td>
<td>13”</td>
<td>14”</td>
<td>15”</td>
<td>16”</td>
<td>17”</td>
<td>18”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For CFM</th>
<th>7,900</th>
<th>8,700</th>
<th>9,600</th>
<th>10,600</th>
<th>11,500</th>
<th>12,500</th>
<th>13,600</th>
<th>14,700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Duct Size of</td>
<td>19”</td>
<td>20”</td>
<td>21”</td>
<td>22”</td>
<td>23”</td>
<td>24”</td>
<td>25”</td>
<td>26”</td>
</tr>
</tbody>
</table>
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 Clear 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.
Specifying a Dust Collector
For a School Wood Shop