

Hive13 Wood Shop - Vote to Improve Dust Collection 2023

Objectives:

- Improve Air Quality by improving Dust Collection
- Reduce Noise Levels in Wood Shop
- Equal or better Machine Placement for Work Flow
- Improved Tool Storage
- Plan for Expansion into the Dungeon

What this plan will do:

- Purchase and Install a [Laguna X|Flux: 5 Dust Collector](#) \$4500
 - Why Now? There is a once a year sale at Mueller Co on Laguna equipment
 - Why make the vote for \$6500? Because of added electrical and duct costs.
- Collect Dust for two to three machines at the same time.
- Cut duct length in half = less resistance
- Make most ducts 6" or 8" diameter to improve flow
- Get at least two to 2.5 times the suck from the Dust Collector
 - Current Tempest DC is nominally rated at 1350 CFM (When new)
 - Proposed Laguna X|Flux: 5 is nominally 3093 CFM
- Eliminate the noisy shop fox DC from the saw stop

What this plan won't do:

- Collect Dust from all machines at the same time - We still need blast gates..
- Eliminate the need for stand alone dust collectors to capture fine fugitive dust.

The Plan - How to Do It

- Propose a vote for a new dust collector - 3hp to 5hp, SinglePhase, 220V - 50A breaker
 - \$6500 - This includes money for electrical connections and some ductwork.
- Move the old TempestCX Dust Collector and connect it to the CNC.
- Mount the New Dust collector to the existing duct work.
- Move tools closer to the dust collector. - Shorter ducts mean better suction.
 - Change the main duct trunk to 8" diameter
 - Shorten and eliminate flex ducts wherever possible.
 - Run 6" diameter hard ducts wherever possible.
 - Increase bend radius to 2x duct diameter
 - Consider modifying tools to handle 6" ducts and blast gates.
 - SawStop, Band Saws, RouterTable,
 - Move tools one or two tools at a time. - Keep the shop Functional.
 - Move lathes to NE corner clear space for tool movement
 - Move Miter Saw to West Wall and Move CNC at the same time
 - Move Planer and Jointer to South Wall
 - Move Saw Stop to Central Pillar
 - Move Big Band Saw to North Wall
 - Move Router Table to West Wall

- Keep the old dust collector dedicated to the CNC router until it dies.
 - Future move: CNC into a separate room West of woodshop.
 - CNC, Air Compressor, and Dust collectors all in a noise isolating room

[Hive13.org Wood Shop Dust Collection Layout 2023.11.03](https://hive13.org/woodshopdustcollectionlayout2023.11.03)

[Hive13 Dust Collection Systems Spreadsheet](#)

Wood Shop Dust Collection Project Background Research

TIL: Conversation with Tyler Schumacher - AireCon MFG Group Sales Engineer

He would design the system from the machine to the DC - Establish the velocity required at the machine outlet, given the port diameter. Min 3500 fpm for fine dust 4000 to 4500 fpm for chips That drives the cfm and the static pressure required to transit the ductwork back to the DC.

In a commercial system the duct network is designed to run wide open, drawing air in through all ports at the same time. The duct network is designed to maintain velocity in the duct by reducing the duct size as the branches and distance from the DC increase. The commercial duct system is then tuned and balanced using adjustable gates and orifices to adjust the air flow. The commercial DC is huge compared to the hobby size we can afford.

Since we have limited funds we buy the DC we can afford and use gated to select one or two machines at a time. The principle is the same, define the velocity required at the machine for the port/duct size and work back through the duct train to determine the static pressure drop and cfm required.

Ideally if two machines are working at the same time, near each other and share a branch the combined cfm required is within the capacity of the DC.

If the machines are on separate branches the same calculation must be done, but there is the additional problem of balancing the flow between the two branches. Orifices and port sizing can be adjusted to balance the branches.

Further issue: If the main duct trunk is 8" dia = 50 sq in you need 1571 cfm to get 4500 fpm velocity. Somewhere below 1396 fpm the chips drop out of the air flow. The problem is that it becomes increasingly harder to get that air flow through a single 6" branch inlet. Possible, but the static pressure goes way up. Eventually the static pressure limits the flow. A solution is to carefully bleed air into the 8" main trunk to keep the airflow up. This can be regulated by adding a gravity/spring loaded doggie door to the far end of the 8" trunk. When the static pressure peaks due to the ports being closed down the doggie door bleeds in enough air to maintain velocity in the trunk and still maintain the static pressure required to hit the velocity at the machine port.

NOTES:

The DC Duct inlets are 8" We will need 25' of 8" duct Plus transitions to 6" drops. ~\$300 Shorter 6" ducts means there should be minimal need for new 6" ducts and blast gates. Less flex duct is a good thing.

ONEIDA duct design service \$400 - Refunded if you buy Oneida equipment
Clearview duct design service is only for customers

Contacted Airecon Manufacturing, U.S. Air Filtration, Inc., OSU, OU and UC for consulting services. Have not found a hobby sized consult service other than Oneida.

Add height to the Router Table to match height with the miter saw station.
Add more ducting to the Big Bandsaw under the table to improve dust collection.

I would like to suggest that the CNC router be far enough from the wall that a person (with a ShopVac) could easily pass. Dusting and easy access to that end of the rails (and the eStop wiring) would be a positive, I think.

I realize the diagram is not cast in stone, but I would also like to propose that the lathes be set with headstocks toward the wall, not the tailstocks as shown.

Also that the lathe in front of the first lathe be angled other than 90° to the wall so that, in the unlikely event that both are in use >and< a blank jumps off the centers or the chuck of the second lathe, it won't go straight toward the first lathe user.

Just thinking too much...