

# ***Adding a Felder Dust Collector to My Studio***

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Right in the middle of finishing up last minute Christmas orders my 5hp Clearvue Cyclone dust collector fractured it's impeller housing spewing fine dust all over the studio and gallery. What a mess, and it couldn't have come at a worse time! The Clearvue folks were very accomodating and said they would send replacement parts right out but I was out of commission and in need of getting things finished right now. That was a Friday morning.

I had long been interested in the Felder Cleantech dust collectors but always thought they were a bit over priced (I no longer think that). None-the-less, I called Felder to see if by chance they had any on the west coast that they could send out quickly. No luck. They said the soonest they could get one would be Feb or Mar, too late for my needs. I then went to the Felder Owners Group forum and posted a request there to see if anyone knew of a used unit that might be available. As luck would have it, one member emailed back over and gave me a link to one that had been advertised for sale. Turns out that one had just sold a week or two earlier. Drats! Over the weekend another

member emailed saying he had seen an ad for one in Bend, OR. I searched and found that ad. It was from a guitar manufacturer.

First thing Monday morning I called them. The person answering said they had just been acquired and the new owners wanted them to consolidate all dust collection into a central bag house system so they did have two Felder RL-200 units available. He said one was loaded on a trailer and about to be taken to one of their off site storage facilities. We talked a bit, agreed on a price for one of them and I asked if by any chance they could drive the unit on the trailer here to Kerby, OR, (about 240 miles) instead of to storage. He agreed and the unit was on its way by 10:00am Monday morning.

These Felder Cleantech units are quite different from the more common cyclone dust collectors. They have a bank of filters sitting horizontally just above where the dirty dust laden air comes into the unit. The dust bins seal tightly to the bottom of the machine below this bank of filters. The impeller and motor sit above the filter bank and only see clean, filtered air. As the dirty air is drawn into the unit, the heavy particles fall into the bins and the fine dust is captured in the filters. A flapper brush can be pulled back and forth across the bottom of the filters to break up the dust cake and cause the fine dust to also fall into the dust bins.

They make several versions of these Cleantech units starting with a small unit which has a 125mm (~5") inlet diameter, a small impeller, one plate filter and one dust bin. The next unit up in size has a 160mm (~6") inlet diameter, a larger impeller, two plate filters and two dust bins. Both of those are available in both single and three phase power. I wanted the 160mm unit in single phase but the one available from the guitar manufacturer was a larger 200mm inlet unit with three phase power. It has two plate filters that are both twice as thick as the 160 and two dust bins. It is larger than I really need, but at the agreed upon price was just too good to pass up.

So, at 10:00am on a Monday morning I am faced with how to convert the single phase power available in my building to the three phase power I would need to run that dust collector. My wife suggested calling a person we knew in Medford in the power electronic business. He said it would be easy to do using a modern Variable Frequency Drive unit and said he could have one shipped to us from the manufacturer's Chicago plant to arrive Wed morning. He said all I would need to do is hook the single phase 220VAC black and white wires to the input side of the unit and the three three phase 220VAC wires coming from the motor on the Felder unit to the output side.

Things are falling into place, or so I thought, and I placed the order.

When the Felder RL-200 arrived later that Monday afternoon, I cleaned it up, moved it into place and began to adapt the dust collection ducting to mate up the the machine. I had to secure some additional 8" flex duct (from a Medford supplier 150 mile round trip away). My wife was nice enough to disrupt her day and make the trek over to pick up

the necessary parts Tuesday morning. Once that was done I then turned my attention to the wiring.

Oops! When I opened the Felder switch box on the front of the unit I was confronted with far more than three wires coming from a motor to a switch. There were six, not three wires (plus ground) coming from the motor.

It was not obvious what all was going in that box so I called Felder technical support. They were reluctant to provide much info about how to make this changeover. After enough discussion they finally decided to email me a wiring diagram

With that in hand it was able to determine that the six wires coming from the motor were the three normal power wires plus three more secondary winding leads designed to help the motor soft start to prevent a high current surge when the unit first was turned on.

At startup, two sets of relays closed. One set provided incoming three phase power to the main motor windings and a second relay also closed providing power to the secondary windings. After a settable time (six seconds in this case - the knob on the blue box shown to the right), the second relay opened and a third relay closed which ganged the three secondary windings together so the motor could run on just its primary winding circuit.

Some of the additional circuitry allowed an air pressure sensor mounted on the dust collector to shut down the motor if the pressure above and below the filters reached a certain difference indicating clogged filters.

Once it was clear how the unit worked, it was easy to remove the Felder control/switch box all together. I mounted the Variable Frequency Drive unit (which did arrive Wed



morning just as promised) to the same plate where the Felder control/switch box had been.



I could then bring in the two 220VAC single phase wires from the same line that had driven my Clearvue Cyclone unit and connect them to the input terminals on the VFD. These are the black and white wires on the left side of the VFD in this photo. The three three phase wires coming from the motor connected to the U1, V1 and W1 terminals on the output side of the VFD. These are shown as the three right most terminals in the photo.

Since the VFD itself had programmable soft start designed right in I could just gang the three secondary wires coming from the motor together, just as the Felder control box did after the first six seconds of "on" time. I used the wrenut shown. That was all there was to it!

When I get time, I will also hook up the pressure monitor as there are pickup points built into the VFD just for such purposes. There also were terminals for an external switch, like a remote control, which would automatically turn the unit on whenever those terminals were connected together. A simple relay on my existing remote control worked just fine.

A bit of programming to set the soft start ramp up time and the run frequency and the unit was good to go. The Felder motor was designed to run on the 50hz common in Europe and other parts of the world. For the US market they simply over drive it at 60hz and the motor just runs faster - and makes more noise. Using the VFD you program in what frequency you want and the electronics do the rest. The Felder dust collector is much quieter running at 50hz.





By Wed afternoon I was back in business! Who would ever have thought that possible? I am out of commission Friday when my cyclone fractured its impeller housing and by Wed of the next week I have a new (to me) Felder unit in place and operational including a conversion from three phase to single phase power.

The Felder unit integrates nicely into my open studio and gallery space even though it is quite a bit larger than the cyclone it replaced. I added a couple of hanging things to make it a bit less intrusive as you can see in this photo.

The Felder unit has several advantages over the cyclone it replaced. The issues I had with cyclones all had to do with the fact that cyclones pull dirty air into a cyclonic chamber where the swirling air slows down and allows the larger particles to drop into a collection bin at the bottom of the cyclone. The dust remaining in the air goes through the impeller and is blown into the center of a stack of tubular filters.

If the collection bin fills up, all the dirty air is thrown into those filters. On my Clearvue cyclone the collection bin was steel so I could not see how full it was becoming and several times packed the filter stack clear full of dust and chips.

That required removing the filters

exposing all that dust and chip mess to the air in my studio & gallery, taking them outside and banging them clean. I then had to also hook up a compressed air hose to complete the cleaning process all the while being exposed myself to all that dust. I never liked that very much to say the least!

Cyclones are also messy when you go to remove the collected dust and chips. If you want to mount a plastic bag inside the collection bin, you need to find a way to hold it down so it does not get sucked up into the impeller. I used a plastic garbage can with the bottom cut off. Stretch the plastic bag over the garbage can, put can and bag into the dust bin. Stretch the open part of the plastic bag over the upper edges of the bin

and roll the whole thing under the bottom of the cyclone. Then it was necessary to find a way to secure the bin to the bottom of the cyclone. I found ways to do that, but none as elegant, clean or effective as the Felder solutions.

With the Felder unit the metal bins have vacuum openings in the bottom which automatically hold the plastic bin liner bags in place. You just roll the collection bin up under the unit and push down on a metal bar. That raises the bin and seals it against the bottom of the RL unit. Slick and quick. To empty the bins you only need to roll the double bin unit out from under the dust collector, gather the top of the bags together with a twist tie and lift and carry them out of the studio/gallery without making a mess.

With the Felder unit in place I also took the time to clean up some of the ducting.

Previously I had used an 8" main line which separated into two 6" trunk lines. Each of those further split until I got to each machine where a 6-4-4 reducer was used to go to the machines themselves.

The first change I made was to split the main line into three 6" branches instead of the two I had before. The 8" line goes directly into the Felder RL200. One of the 6" lines goes to the lathe. That one also branches to a

floor vac hose we will see a bit later. The center 6" trunk line goes to the router table, oscillating spindle sander and oscillating edge sander. It also feeds the small inlet on the overhead blade







guard pickup point on my European combination machine.



The left most branch services the two band saws, the 17" wide belt sander and the combo machine. Only one of those is in use at any time so the 6" line works just fine servicing those machines.

To improve dust collection on the two band saws I made a couple of improvements.

The 14" Delta came from the factory with only a useless 1.5 to 2" inlet under the table around where the lower guides are located. Even with a high draw Festool vac. hooked to that port the saw was always covered with sawdust after use meaning it was throwing a lot into the air. To fix that, I cut a 4" hole in the lower part of the lower door and added a DC port there. That really made a big difference and that saw now runs virtually dust free. To change blades I remove the blast gate and the DC port will move nicely behind the saw as the door is opened.

The 24" band saw came with one 4" port on the front of the machine where the lower guides are located. In this case there is an isolator piece of metal that receives a wooden block through which the blade passes so it captures far more of the dust off the blade than the 14" Delta ever could. Even so, a lot of



dust was carried in the blade gullets and thrown off elsewhere. To help capture that dust, I again added a 4" port to the lower door.

To "sort of" properly branch the 6" trunk into two 4" feeds for those two ports on the 24" bandsaw I used what I had which was two 6-6-4 right angle branches. Not the most efficient, but they work just fine here. One 4" line runs to the front port and the other to the new port on the lower door. I hardly see any dust now except what is spit out of the blade before it goes into the lower part of the saw. It is a vast improvement.

That 6" trunk continues on to supply the 4" drop for the 14" band saw or the 4" drop to the 17" wide belt sander. Since only one of these three machines is ever in use at any time, this seemingly restrictive ducting works just fine.

Note that the main 6" trunk divides before it gets to these various 4" drops. The main 6" trunk



which is a bit hard to see in this picture goes in hard pipe down under the floor and exits up behind the combination machine which has two 4" ports. I use a 6-4-4 at that

point and leave both 4" ports open when using that machine. Two 4" ports have about the same area as the 6" trunk line.

In this lower photo left you can also see the small line that runs from the center 6" trunk over to feed the top of the blade guard. With all three of these dust ports open, the combination machine does a good job of capturing most of the dust and chips generated there.



The oscillating spindle sander and oscillating belt edge sander posed some unique problems of their own. Neither machine comes from the factory with very satisfactory dust ports. In the case of the spindle sander, the only port is one that is under just the back side of the spindle below the table. All the dust created above the table mostly goes into the air and your lungs. I wanted to add a second port that would reside above and surround the spindle to get that dust before it goes into the air.

The edge belt sander only came with a port at one end of the belt. The idea apparently was that dust coming off the work piece along the front edge of the belt would be thrown down the belt and captured by that one port. Wow, what creative thinking! No way does that get much of it as there is simply too much open area around the belt for that to be effective. I wanted to add a second port that would be able to follow the leading edge of the work piece and get the dust right where it is created. The factory port could then just serve to get the remainder. I also wanted a floor sweep at that end of the studio so I needed five different 4" drops to come off of the 6" trunk that goes services that area.



My solution was to build a distribution box that hangs on the wall. The 6" trunk line comes in the top. Two 4" blast gates supply the spindle sander along one side of the box. Two blast gates along the other side of the box supply the belt sander and one on the bottom of the distribution box goes to the floor sweep. Since no more than two of these are ever open at the same time, this system works quite well.

Here is the partially completed system. You can see the 6" trunk coming into the top of the black distribution box. Along each side are provisions for two 4" blast gates. Only one has been installed on each side at the time this picture was taken. The other two are covered temporarily. The two currently open ports go to the factory ports on the edge and spindle sanders respectively. The 4" blast gate that exits out the bottom services the floor sweep. When I get time, each of the two now covered ports will feed an overhead dust port going to each

machine. That should tame those monsters.

The final two machines that needed to be serviced were the lathe and router table. The third 6" trunk line goes directly to the lathe work station. One branch off of the center 6" trunk line goes to the router table which has a surround that fully encloses the router itself. The dust port is mounted at the bottom of that surround. Dust is drawn downward from the router bit and into that surround chamber. From there it exits out the 4" line that connects to a 6" branch off of the 6" trunk. Very effective.

This picture shows the router table setup.



The lathe presents a more difficult challenge since it can throw chips in all directions. I built an open front box with a 6" blast gate on

top. That box rides back and forth behind the lathe and parallel with the lathe bed so it can be positioned where it is most effective for the cut being made.

What you see in the picture above is the box before I added the 6" flex line drop. In the pic the old 4" drop is still shown falling down behind the new collection box. There is a strap that connects to the bottom of the box at the rear and snaps onto the metal grid protecting the window. That allows me to lift the box for even better positioning. It isn't perfect, but is still far better than nothing. None the less, I still wear a full head, positive air flow helmet any time I work at the lathe.

The last part of my dust collection system is a long reach 4" floor vacuum hose. On one of the three 6" trunk lines I created a 4" port at the ceiling. To that I added a piece of regular 4" flex hose long enough to reach to about waste level. I put a blast gate there and placed a piece of Dust Right 4" long reach hose to the bottom of the blast gate.



With that set up I can reach about a 25' radius all around the studio and out into the gallery area where the Felder RL-200 dust collector is located. That is really handy to vacuum up any dust that escapes from the DC while I am emptying the bins.

It also is great to allow an easy way to vacuum the whole floor all around my most common work stations. Between this long reach floor vacuum hose and the floor sweep at the far end of the studio, I really don't have to reach for the hand dust bin very often any more.

Here is a picture that shows this long reach floor vacuum line stored out of the way against the wall where the Festool guide rails and long levels hang. A strap on the feed hose right above the blast gate hooks on the wall to keep the hose out of the way. The Dust Right hose and hard tube keep things nice and neat until they are needed. Since that 4" drop is located so close to where the 8" main branches into the three 6" trunk lines the suction on that floor vacuum line is enough to pick up most anything, including pieces of scrap wood and loose screws.

All of my hand power tools are from Festool so they all have their own built in dust collection. One Festool CT dust collector is attached to the Kapex compound miter saw. One is used with all the sanders at my main sanding work station and a third is a rover that goes wherever a guide rail Festool is in use. Those really are effective and I highly recommend the complete Festool system for all your hand power tools. They cannot be beat from my experience.

The last line of attack in my relentless fight against dust in my studio/gallery is two ceiling mounted air cleaners that are on timers so they run for a couple of hours every night.

I will update this tutorial when I get time to complete the lathe collection box and the oscillating sanders collection system.

Jerry