Dust in the Wind

by Sean D. Shields

Learn how to quantify and report sawdust emissions in your operation.

When it comes to sawdust, your biggest problem is not your saw, it's your automobile. Not just your car, but the fact that almost everyone has one and uses it daily. Car exhaust is full of carbon monoxide and particulate matter (PM), and both have proven to have a potentially negative impact on human health.

As a consequence, local and state governments are trying to limit the production of harmful emissions and PM in their regions. Having gone through this process myself, I can tell you that government officials are, for good reason, hesitant to discuss options that limit the largest contributor to the problem: cars. Instead, they leave no stone unturned in their effort to find and reduce all other sources of harmful air emissions.

As such, regulating production facilities like yours is generally one small aspect of an overall plan to drastically limit the amount of airborne PM generated in a geographic region. The problem is that as structural component manufacturers attempt to obtain permits for expansion or new construction in these "non-attainment" areas, they are often met with very stringent requirements pertaining to PM generation.

Why, you ask? Unfortunately, as a facility that handles and processes wood, your operation is a known producer of sawdust, a form of PM, that is regularly lumped together with the likes of sawmills and furniture manufacturers. This comparison is based on a widespread misconception of the operational practices of the structural building components industry. The good news is there is a way to address this problem and prove you don't produce enough sawdust PM for them to worry about.

Particulate Matter (PM)

The U.S. Environmental Protection Agency (EPA) is charged through the Clean Air Act to monitor air quality and set limits on various airborne toxins that may be emitted. As more and more regions of the country exceed these limits, and become areas of "non-attainment" as deemed by the EPA through the Act, local and state governments are passing regulations to limit the production of harmful emissions and PM.

Federal and state environmental protection agencies have long qualified sawdust as "particulate matter," or PM, and have adopted various regulations according to the size of the PM. Particle size influences two key factors: how long it will likely remain suspended in the air, and where in the body the particle may lodge itself if inhaled.

at a glance

- Wood truss operations produce sawdust, which is a form of particulate matter often categorized with sawmills and furniture manufacturers.
- By quantifying the sawdust you actually produce, you can prove baghouse system requirements unnecessary.
- One method to determine quantity is to calculate a source's potential to emit (PTE) with an emissions factor.

Generally, PM is measured in microns (one-thousandth of a millimeter). For a sense of scale, 10 microns is roughly the width of a human hair.

The smaller the particle, the greater the threat it can pose to human health. While particles larger than 10 microns are effectively filtered by tiny hairs in the nose and throat, they can cause irritation of those areas. Anything smaller has a chance of getting into the respiratory system and blood stream and may cause significant harm. Particles 10 microns or smaller are referred to in governmental regulations as PM10, and are subject to quantity limitations—generally in tons per year.

Woodworking operations, along with the sawdust (PM) they produce, are coming under greater scrutiny by air quality regulators because they contribute to overall airborne PM levels. Increasingly in urban areas, PM levels are exceeding national EPA limits. When this happens, the area is considered in "non-attainment" and must submit plans to federal regulators on how they will reduce their production of PM back below the limit.

The worst case, as some component manufacturers in Virginia and Colorado have found out when applying for permits to expand and open new facilities, state governments may require you to install an expensive pneumatic conveyance and baghouse system to contain your sawdust. Generally referred to simply as a "baghouse," this arrangement of hoods, ductwork, fans, filters and storage "bags" collects sawdust out of the air as it's generated by your saws.

However, through quantifying the sawdust you actually produce, as opposed to the amount generated by other woodworking facilities like furniture manufacturers, you can prove such requirements are unnecessary.

Quantifying Sawdust Generation

It seems logical to assume the type of woodworking the building components industry does—single or multiple cuts on softwood 2x4 or 2x6 lumber—produce larger size sawdust, most of which should fall outside of the PM10 classification that is so heavily regulated. However, there appears to be no empirical evidence within the industry, through controlled testing or otherwise, to prove this assumption.

This lack of evidence has posed a potential problem as air quality regulations become more stringent with regard to PM10. The industry is left open to the misconception that you produce the same amount and type of sawdust that furniture manufacturers do. We all know this simply isn't the case. However, due to a lack of proof, federal and state regulators are left to use the data they do have on woodworking facilities, which has been provided to them by furniture manufacturers. Fortunately, there is an alternative.

One method employed by the EPA in determining quantity is calculating a source's potential to emit (PTE) using an emis-

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sions factor. An emissions factor is an approximate value that attempts to relate the quantity of a pollutant (sawdust) released to the atmosphere with an activity associated with the release of that pollutant (cutting wood). Let's look at how you can utilize an emissions factor to quantify sawdust generation.

An emissions factor is used to estimate PTE emissions using the following formula:

E = A x EF x (1-ER/100), where:
E = emissions of PM sawdust;
A = activity rate;
EF = emission factor, and
ER = overall emission reduction efficiency, %

Activity Rate

To use the formula provided above, you first need to identify your activity rate (A). For component manufacturers, your activity rate should quantify the annual number of tons of sawdust your facility has the potential to emit (PTE). According to the EPA, the PTE of each of your truss saws is considered to be its average hourly sawdust production multiplied by 8,760 hours (i.e., the number of hours in a year).

To determine your annual truss saw PTE, or activity rate, you would utilize the following formula:

A = 8760 Hours x (Board Feet (BF) of Material Cut/Hour) x (Weight of Material)

Further, to determine your material cut/hour, you would use this formula:

Material Cut/Hour = Wood Length x Wood Width x Blade Thickness x Number of Cuts/Hour

To find A, here is an example for a typical component manufacturer:

XYZ Truss has two linear truss saws that exclusively run through 2x4 dimensional southern yellow pine. First, to determine the material cut/hour, the above formula would be used in the following manner (we will assume the cut has a slight angle, so the length will be 5.5 inches instead of a straight cut of 3.5 inches):

Material Cut/Hour = (5.50 inches) x (1.50 inches) x (0.25 inches) x (1000 cuts)/Hour

In order to convert the measurement into board feet, the wood volume must be divided by 144 inches:

Material Cut/Hour = (2.063 in3) / 144 inches x (1000 cuts)/Hour

Consequently:

Material Cut/Hour = (0.014 BF) x (1000 cuts)/Hour; or roughly 14 BF/hour

Since XYZ Truss has two truss saws, the facility has the capacity to cut 28.0 BF/hour. According to the U.S. Dept. of Agriculture, Spruce-Pine-Fir (SPF) has an average weight of 2.5 pounds/BF.

In this example, it is now possible to determine the activity rate (A) using the formula:

A = 8760 Hours X 28.0 BF/Hour X 2.5 pounds/BF

A = 613,200 pounds

In this example, XYZ Truss annually has the potential to generate 306 tons of sawdust.

Emissions Factor

In most cases, emission factors (EF) are simply averages of all data available from acceptable quality sources, and are assumed to be representative of long-term averages for all similar sources. The primary source of emission factors is the EPA's "AP 42" document, which lists the factors reviewed and approved by the agency. As of 2001, AP 42, Chapter 10: Wood Products Industry, listed an emissions factor of 0.35 for the rough wood cutting generally employed by the structural building components industry.

Unfortunately, that emissions factor has been temporarily suspended. However, it is the best data currently available to calculate potential emissions, so we'll use it in this example.

Emissions Reduction Efficiency

In this example, XYZ Truss, like most component manufacturers, has not installed a sawdust collection system. They manually sweep up the floors multiple times each shift and deposit the dust in garbage cans that are emptied into a large storage bin outside. The bin is collected bi-weekly and transported to a local stable yard for horse bedding.

According to the EPA's Office of Air Quality Planning & Standards, XYZ Truss has an overall emissions reduction efficiency (ER) of zero percent. Typically, baghouse and cyclone dust collection systems used by the furniture industry have an ER between 90-99 percent.

PTE Sawdust Emissions

In this example, XYZ Truss can now use the formula to calculate their total annual PM sawdust emissions:

E = A x EF x (1-ER/100)
E = 306 tons of sawdust/year X 0.35 X (1 - 0/100)
E = 306 X 0.35 X (1.0)
E = 107 tons of airborne PM sawdust/year

Conclusion

If you find yourself having difficulty obtaining permits due to concerns about your sawdust production, using this formula to quantify your PTE sawdust emissions may help you address this problem. This formula is discussed at greater length in the recently published WTCA *Management Note,* "Quantifying Sawdust Generation and Health Risk Factors," available at **www.sbcindustry.com/kb/managementnotes.php**.

In addition, if you're having difficulty with this issue, please don't hesitate to contact WTCA staff, who can help you use this formula or work with individual regulators to reach a solution. SBC

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Truss Publications, Inc.

6300 Enterprise Lane • Suite 200 • Madison, WI 53719
608/310-6706 phone • 608/271-7006 fax
www.sbcmag.info • admgr@sbcmag.info