Waste Gas Purification for Chip, OSB and MDF Dryers as well as Press Waste Gases

In the past, various operating systems have been used for the purification of waste gases. While the initial approach was to purify the waste gases via fabric filters or scrubbers, it soon became obvious that these systems tended to clog and/or had an inefficient degree of separation.

Based on that experience, the late eighties saw the introduction of the first dry electrostatic precipitators as well as one and two-stage chemically absorptive scrubbers. But these systems did not produce the desired and required degrees of separation either. In addition, dry electrostatic precipitators presented a great fire hazard, and the scrubbers caused substantial expenses for chemicals as well as problems with the disposal of waste water.

Consequently three different systems were developed:

a) the bio scrubber
b) the regenerative thermic oxidation (RTO)
c) the wet electrostatic precipitator (WESP).

Because of its high operating costs, high maintenance effort and limited application, depending on the fuel used, the bio scrubber was not generally suitable. The RTO systems achieved excellent separation rates for hydrocarbons, but could frequently not meet the particle limits. An additional problem was the clogging of the heat transfer modules as well as high operating costs for auxiliary fuels.

The system that has gained acceptance is the wet electrostatic precipitator!!

The wet electrostatic precipitator system is a physical separation system combining five operational processes:

1. Quencher
2. Scrubber
3. Wet electrostatic precipitator
4. Postoxidation
5. Mist collector.

The waste gases are first cooled down to dew point temperature in the crude gas lines by the injection of absorbent, causing the pre-separation of emissions. Then the waste gases are led into the – usually vertically arranged – separating system. Here the waste gases pass through a scrubber and the actual wet electrostatic precipitator. Particles, condensates, terpene hydrocarbons, aerosols etc. are separated. Hydrocarbons, such as formaldehyde, are further oxidized by a high-tension field of approx. 130,000 Volts. The succeeding mist collector additionally reduces the discharge of agglomerated droplets.

EWK Environmental Engineering employed this type of system for the first time in 1991 in a chip dryer and for press waste gases and since then has continuously improved the system. It can be adapted to the individual production plant, as has been done at TRADEMA in Valladolid, TAFISA in Solsona, or CASCA in Oliveira do Hospital.

Adaptation means that the composite system is optimized specifically for a particular plant, depending on the fuel used, whether combustion chamber or hot gas generator, whether directly or indirectly heated dryer, whether multi-cyclone product separator or precipitation casing with individual cyclones, whether freshly cut wood, resinous wood or recycled wood is used.

The WESP system is marked by high availability and the fact that it does not produce any waste water. The operating costs are low because, with few exceptions, there is no need for chemicals. Depending on the production sequence and the location, it would also be possible to incorporate heat recovery systems that would reduce the consumption of primary fuel, so that the operating costs would be amortized.

In its present state, the composite system meets the BATNEEC requirement (Best Available Technology Non-Excessive Economical Cost).

The plant system meets all present local limits, be it in Central, South, North or Eastern Europe or even in Asia. That means compliance with the following pure gas emissions:

Particles	< 10 mg/Nm³ wet
Hydrocarbons	< 100 mg/Nm³ wet
Formaldehyde	< 20 mg/Nm³ dry
Blue Haze	invisible
Odor	separation > 50%

For organic compounds there exist only two country-specific limits at present, to the best of our knowledge:

UK standard PG 4/6 (95)	VOCs	< 130 mg/Nm³ wet
TA Luft 2002	TOCs	< 300 mg/Nm³ wet

Upon examination of the above two limits, one finds that only Great Britain is pushing a specific emission reduction for hydrocarbons. Under the German TA Luft, a dryer plant of equal design would not require a waste gas purification plant.

In reality, however, things are different!

Local, regional environmental protection agencies and especially the general public demand a minimization of odor and blue smoke. Both emissions are caused by micro-fine aerosols. The otherwise annoying emissions of dryers and presses are only avoided with TOC contents of < 150 mg/Nm³ dry.

The above-described wet electrostatic precipitation method, the ***"WESP System"***, is the one to meet these requirements.