# *ESCO NEWS*

**OCCASIONAL NEWS AND INFORMATION FROM ESCO ENGINEERING**
**NO. 7, February 1995**

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## *PICKLE LINE MODEL*

ESCO Engineering has now developed a spreadsheet model of a continuous HCl strip pickler. The model is ideal for:

- estimating operating costs
- performing "what if" evaluations of proposed changes to the line without having to make the changes in the field
- optimizing line performance

Operating parameters such as steel throughput, size, line speed, tank temperatures, and spent acid composition are input, and the model calculates tank conditions, losses in the exhaust, effluent composition, % pickled (i.e. whether it is under- or over-pickling) and utilities consumption.

The basic spreadsheet has three pickle tanks and four countercurrent rinse stages, but it can be customized for your configuration.

*The spreadsheet is FREE to ESCO customers and $250 to non-customers.*

If you're interested in obtaining a copy, call or fax us. We'll send you a data sheet to fill in so that your model can be tailored to suit your system.

## *FUME EXHAUST TIPS #4*

Scrubbers - Part 1

A fume exhaust system is designed to control emissions of volatile hazardous materials into the workplace; it does this by carrying away these vapors in a stream of air. Before this air can be released to the atmosphere, it must be cleaned - *this is the job of the fume scrubber*.

Most of the scrubbers in fume control service fall into three categories:

- *entrainment eliminators*; these are for removing droplets of liquid (often very fine aerosol droplets that behave like gases). Typical applications are alkaline cleaners, chromic acid and sulfuric acid tanks.
- *packed scrubbers*; these are mainly for removing water-soluble gases, although they also serve as entrainment eliminators. Typical applications are pickle tank exhausts. A favorite configuration is the cross-flow type which needs less head room than the vertical counterflow tower, but is less water efficient. All packed scrubbers require large volumes of water, which is usually provided by recirculation pumps.
- *plate scrubbers*; these are for the same applications as packed scrubbers, but use much less water, and require no recirculation pumps. In many cases, a low volume of acid of high strength can be recovered from these scrubbers; this can be returned to the pickle tanks as make-up, thereby saving both the loss of acid and the use of caustic to neutralize it.

Any of these types of scrubber may be the 'best', depending on the application. (See *FREEBIES* for information on how *you* can obtain a paper with a detailed discussion of the factors involved in selecting a fume scrubber).

The scrubber can only remove fumes that are in the incoming air - if the fumes in the plant are bad, don't blame the scrubber; look for problems with the fan or the ducting. If the fumes in the stack are bad, then the scrubber may need attention.

Generally, scrubbers run with little attention, which is what they get.

*Next time we'll talk about scrubber problems, and what to do about them.*

## *FREEBIES!*

Still available, *free of charge* from ESCO:

- "The Why's & How's of Sulfuric Acid Pickling".
- Neil Stone's AISE paper describing how plate type fume scrubbers work, and how they can benefit you
- our spreadsheet software for determining *open tank emissions*

*Write or fax us for your free copies today!*

## *SCALING FACTORS*

One of the commonest maintenance problems in all types of fume scrubbers, but especially in packed beds, is plugging due to scale formation. Sometimes the scaling is so serious that the packing has to be broken out and replaced.

Packed beds are quite efficient at removing coarse particulate, such as dust in the plant air that is being induced into the fume exhaust system. However, to keep this particulate in the packing requires some sort of 'cement', and this cement is often calcium salts resulting from the reaction of hard water with acids in the fumes.

Two particularly bad actors are sulfuric and hydrofluoric acids - both calcium sulfate and calcium fluoride are very insoluble in water, and can quickly scale up a scrubber.

One answer is to clean packing regularly, but a simpler solution is to use soft water - install a water softener in the scrubber water supply. This replaces the calcium in the water with sodium, and sodium salts are all soluble.

Of course, this is only a practical solution if the scrubber water consumption is low - ESCO's plate-type absorbers are ideal for this, as they use a minimal amount of water while still providing efficient scrubbing (and there is no packing to plug up either).

## *THE VIEW FROM THE FIELD*

PROCESS OPERATORS - A NECESSARY EVIL?

Have you ever thought about how much easier it would be to have your processing systems completely automated, so you wouldn't have to rely so much on operators?

Although that thought crosses a lot of minds, in reality process operators are still necessary, even with the abundance of automation available today. There are some very basic reasons for this:

1. The cost of completely automating systems is way out of reach for small or medium sized processors *(try to have a budget for this approved some time).*
2. Sophisticated automated systems require specialized and educated personnel to run and monitor them (*are you willing to hire technologists or even engineers to run your systems?)*
3. If you did not have operators and you simply relied on a computer to run things, who would hear a change in the sound of a pump, who would see a leak on a steam line, who would find a level too high, a flow out of line, a pressure too low - *even if the computer indicates otherwise?*

This last point is where the operator shines. Lets face it, the computer will not blow out a plugged line, tighten a packing on a valve, make a small adjustment to a machine, figure out why a pump is not getting suction, where corrosion is taking its toll, why a compressor is not unloading properly etc. etc. The list is endless, especially if the operator is trained properly on the practical side of the process he is controlling.

If you are heading toward automation, as everyone eventually will, do not forget to polish up your operators' knowledge about the process. After all, they will be the ones who must keep the physical system rolling, who will make sure that the computer gets the information it needs to control the process, and who will make sure that what the computer puts out is really happening; because, in the words of some early computer wizard *"Garbage IN equals Garbage OUT!"*

## *TANK EMISSIONS*

We get a lot of calls from companies that have been referred to us by the EPA for help in calculating vapor losses from pickling tanks into the exhaust air. If you need to do this, to meet the new reporting requirements, call or fax us and ask for a copy of our emissions spreadsheet - it's free. If you don't have Lotus or Excel, we can tell you how to do the calculations, or, if you prefer, run the calculation for you.

The spreadsheet will calculate HCl, nitric/HF and water losses for both open and closed tanks. Unfortunately, sulfuric acid losses are purely mechanical, and not possible to predict -

Sorry about that, sulfuric picklers!

## *GOOD FOR A LAUGH*

What worries me is, why did God give the tortoise a drag coefficient of 0.00006?