ESCO NEWS

OCCASIONAL NEWS AND INFORMATION FROM ESCO ENGINEERING

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On the net

We have changed our web page address to http://www.esco-engineering.ca. As always there are free downloads for different programs such as our emissions loss from pickle tank spreadsheet, transient heat gains and losses spreadsheet and much more.

We are also changing our e-mail addresses with the new addresses being

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pas@esco-engineering.ca	Paul Stone

You can still reach us at the old e-mail addresses since they are linked to the new address but update your address book now for future reference.

Seminars

In 2002 our chief Engineer Neil Stone was asked by Wire Association if he would do a seminar on wire pickling, which he did in July of 2002 (Acid Pickling: Science - not a black art). Since then due to demand for such courses we have expanded the number of courses available. We now offer courses in all types of pickling and can customize the course to suit the needs of the customer.

The topics covered in a typical course are

- Chemistry of pickling
- Pickling conditions- acid concentration, temperature
- Pickling process discussions
- Rinsing theory and practice
- Strip drying
- Fume control
- Waste treatment
- Spent acid handling
- Other topics can be added based on the specific type of pickling being done and needs of the customer.

There is also a course on fume scrubbers, which covers all types of fume scrubbers but is more oriented towards wet scrubbers. The topics covered are how they work, how to maintain a working scrubber and methods of fume control.

PIPE FLOW, #2

Continuing the series, we discuss the effect of the pipe size on flow rate.

As pipe diameter increases, the capacity of the pipe increases dramatically, for the same pressure drop – in fact, the capacity of a pipe, in turbulent flow (low viscosity fluids) is proportional to the fifth power of the diameter. This means that a 2" pipe has 32 times the capacity of a 1" pipe! For laminar flow (regular viscous materials like sugar solution), the pipe capacity is proportional to the fourth power of the diameter (2" pipe has 16 times the 1" pipe capacity), while for shear-thinning fluids (tomato pastes and many other food products) the capacity is proportional to about the 2.25 power of the diameter (2" pipe has about 5 times the capacity of 1"). The reason for the lower capacity gain with shear-thinning fluids is that, as the fluid velocity increases, the apparent viscosity of the fluid falls – since viscosity is a major factor in laminar flow, this offsets the increase in pressure drop in the smaller pipe.

The other side of the picture is that a small change in diameter (from fouling, or due to using tube instead of pipe) can cause a substantial drop in pipe capacity. For example, in turbulent flow, using 2" tube (1.87" ID) instead of 2" sch 5 pipe (2.157" ID) halves the flow capacity.

Pressure drop in piping is directly proportional to the length of the pipe, so pipes are often undersized where short lengths are involved, and the higher pressure loss can be tolerated. However, fittings and bends can have a major effect, as will be apparent in the next article.

FREE INFORMATION

Publications available from Esco are listed on our Website:

www.esco-engineering.ca

Which also contains instructions for downloading or requesting them.

Our e-mail address is:

jnstone@esco-engineering.ca

Software FYI

Once again Autodesk is sticking it to their customers by making them upgrade their Autocad 2000 and earlier software by January 15, 2004 or lose the ability to upgrade these licenses. This is the second time in four years that Autodesk is doing this to their customers. The last time not many customers complained because of the new features added to the new version. This time the new features do not live up to the cost of the upgrade and many Autodesk customers are thinking no more.

Rinsing System Part 1

What system is the best for rinsing steel strip after pickling? This is what everyone wants to know but not everybody has the same idea as to what is the best system.

Everyone agrees that the countercurrent multi-stage rinse is needed to get proper rinsing without using large volumes of water. The countercurrent flow works by rinsing with the dirtiest water on the dirtiest part of the strip and the cleanest water on the cleanest part of the strip.

The efficiency of a rinse section is known as the rinse ratio. This is the amount of drag-out from pickle tank to the amount of fresh water entering the rinse. In a multi-stage rinse each stage of the rinse has its own rinse ratio. If you have a rinse section with 3-stages and a 1gpm drag-out between stages with 20 gpm countercurrent flow you have a 1:20 rinse ratio for each stage but a 1:8000 rinse ratio for the rinse section. If the drag-out from the pickle tank is 10% HCl and 5% Fe then the pH of the final rinse stage would be 3.5 (not quite the recommended pH of 4-5).

One thing which is commonly overlooked in rinse design is the drag-out between stages. If there is not good separation between stages a large volume of dirtier water is dragged back into the cleaner water of the next stage. If we use a 1:5 rinse ratio (4gpm drag-out) between stages as an example and keep the 1:20 between pickle tank and rinse then the overall rinse ratio is 1:320 and the final rinse is at a pH of 2. To get the same rinsing overall efficiency as the one above you would need over 50gpm compared to 20gpm.

Operator Training - Understanding the process

When training operators one of the most important things to do is to get them to understand the process and how they are involved in making the overall process work. By showing them how they are involved gives them a sense of self-worth plus gives them the chance to have valuable input into improving the process. Since they know how other areas are affected by changes in their area you can explain why things will work and not work.

To understand a process the first place to start is the process flow diagram and material balance. From these it can be determined the amount and location or timing of the necessary component inputs and outputs from the overall process. The flow diagrams should be very simple with material flows and temperatures shown directly on the flow arrows to make it easier to understand. All reactions taking place in the process should be explained with all products, byproducts and the time required for the reactions to take place.

By giving the operator the knowledge to know whether the process is operating properly gives them the ability to see if changes to the process have a negative or positive effect. It is less likely for a operator to try to short cut a step in the operation and more likely that they will make the correct choices when adjusting process parameters.

All of this allows for a better operating environment for all involved with the process and may decrease overall cost.

GOOD FOR A LAUGH

From www.perfectworld.org