How to make significant cost and energy savings through cleaning up your process water

The drive to achieve ever increasing quality standards in the UPVC window/conservatory extrusion industry has led to significant capital investment in recent years. The process dictates cooling water be supplied to the process that is kept at a constant temperature in order to maintain profile accuracy, and this in turn has brought the focus to the water quality.

The process is an exacting one where many other filter technologies in the past have failed to give the water quality demanded by the process, whilst at the same time protecting the process water chillers.

In order to meet these demands we have developed a high efficiency sand filter called the CrossFlowMF1.0 which filters below 1.0 micron - reliably – even achieving down to 0.45 micron to ensure cleaner process water.

[Picture Left: The CrossflowMF1.0 high efficiency Sand Filter which can be fitted as a modular system.]

Why is this media filter technology so significant for the UPVC industry?

The manufacturing process generally sees water used on the wet calibration section; this is where the still semi molten plastic is extruded into a channel which contains stainless steel profile calibration tools. The tools are manufactured in descending size the final one is designed to give a very accurate cross section of the profile required.

The calibration section is continually flooded with large volumes of pressurised chilled water, usually between 10 C -14 C, and the volume used can be considerable. Typical volumes for extruder plants can range from 80,000 litres per hour to 500,000 litres per hour and all of the water flow needs to be filtered to exact standards, usually accepted as being to 20 micron in order to further improve product quality.

The problem with the process is complex, but basically water can be contaminated from a number of sources, some of which are controllable, others less so. Many processes use plastic polymer as a base product, this fine dust can be spilt on occasions be released into the general atmosphere, this contamination generally falls or is brushed into the water return system, which is often located at floor level. This results in high levels of contamination within the water. If left this contamination would, within a very short period of time (literally hours), present itself as a major production problem.

The solids combined within the water are passed along with the water through the chillers (many instances of chillers heat exchanges becoming blocked are common). However the contamination passes forward to production with the small particulates of raw polymer find themselves trapped between the profile and the calibrator tool, the result is the scratching of the profile. This is not just a single scratch but often multiple parallel tracks running the length of the profile, resulting in poor quality which often leads to scrapping of many meters of profile. Surface scratching in turn produces plastic swarf which further exacerbates the problem as this is washed away by the water to the cooling side of the process.

This cycle of solids can be unpredictable and variable in the amount of solids in the system at any specific time, and the main strength of the CrossFlowMF1.0 sand filter is that it reacts immediately and backwashed collected solids drain thereby protecting the production process. The benefits to the client can be summed up as follows:

- Reduced product losses – scrap rates due to surface scratching are minimised or completely eliminated
- The use of chemical water treatment is reduced as the water is clean, and therefore produces less organic load
- A chillers reliability is maintained as blockages are eliminated by filtration
- Tool life is extended due to reduced water contamination
- Stability of process temperature due to cooling of “clean “ water rather than dirty water gives tighter tolerance of product resulting in less scrap
- The ability to reuse of process water just once can reduce the carbon footprint on potable water by a staggering 50%
- The ability to produce and distribute potable water for non potable application becomes a reality
- Electricity bills are significantly reduced by improving heating and cooling systems efficiencies

Operationally, the CrossFlowMF1.0 sand filter utilises a unique patented vortex bed stabiliser which maintains flat bed filtration with high surface turbulence. This ensures that no bio-fouling can be seeded whilst holding filtered contamination in suspension above the media bed. This gives lower pressure drops, longer filtration and shorter backwash cycles making direct savings on operational costs.

The high interstitial void volume of the media allows for greater dirt holding capacity and contamination interaction for the Zeta potential of the media to remove the finer particulates down to 0.45 micron.

Compared with conventional media filtration, the inlet configuration allows for high flow rates, these being 5 times higher than the normal accepted flux rates of conventional filters. Backwash volume used is also significantly lower, especially when the longer operational period is taken into consideration. It is also more effective with backwash times per unit being as low as 2 minutes.

This new technology has been shown to provide a high efficiency removal rate of over 86% at 1.0 micron in one single pass whereas conventional filters have to undertake multiple passes to get anywhere such efficiency.

So, by reducing the load on the filter in this way you are increasing the cycle between cleaning and reducing the amount of times the process has to stop for the membranes to be cleaned. In addition, because the need for chemical filtration is reduced this in turn reduces the impact on the environment. By using sand as a filter it also solves the problem of bacteria build up.

Those in the extrusion industry are already reaping the rewards. For example, Gwent based Custom Extrusions, part of the Epwin Group, produces 10,000 tonnes of profile per year. With the addition of a CrossFlowMF1.0 high efficiency sand filter installed within its filtration plant the company has seen a dramatic 75% drop in customer complaints; has had no issue with surface scratching whatsoever; seen a phenomenal increase in production time and reduced process scrap by 20%. Putting these factors together Custom Extrusions is seeing a staggering financial saving in excess of £100,000.00 per annum!

Visit www.industrial-purification.com or contact the sales team on +44 (0) 1744 811652