Steamless or Less Steam?

You choose the wave of the future! European laundries are already pursuing alternatives to steam boilers

Hot water reuse systems for tunnel washers, like the one at left, are part of a technological trend in Europe driven by costs and regulatory pressures that are encouraging laundry operators to ditch steam boilers and heat water by various other means.

By Gerard O'Neill and Bob Corfield

The term "steamless" or "less steam" can mean a variety of things to different operators of commercial laundries. While for the last 100 years or so "conventional steam laundries" have been the accepted practice, a NEW practice has reached our shores here in the United States. Europe has jumped on the bandwagon for the last number of years, and some of our European manufacturers here in the United States have started to introduce a system whereby NO steam is used in the laundry process. This means no boilers, no condensate, no steam traps, no boiler operator/engineer, etc. In fact the EU (European Union) has initiated a study called SMILES (Sustainable Measures For Industrial Laundry Expansion Strategies), also known as the "Smart Laundry," whereby the EU authority will investigate and further develop and implement new sustainable technologies for water and energy savings and CO^2 reduction of EU industrial laundries.

Costs drive new paradigm

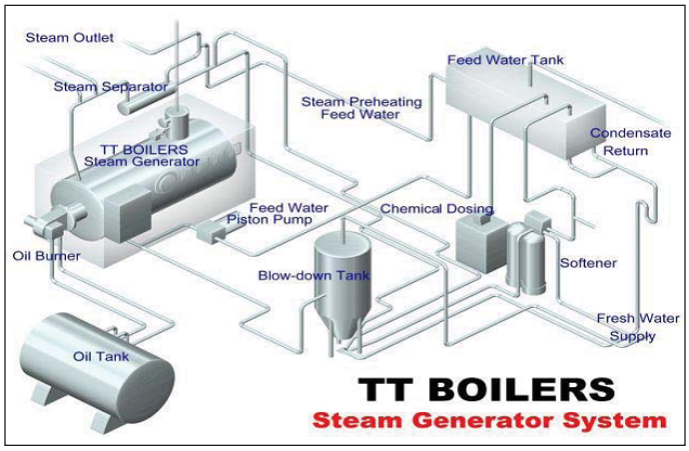
Why do we (as Americans) care about what they do in Europe? Well here's why. Water in the United States is becoming more expensive, not only to get from the local water authorities, but also to treat. This fact is made clear by the ever-increasing wastewater sewer discharge costs (a recent customer of American Laundry Systems (ALS) was hit with a 40% increase in wastewater/sewer charges) EFFECTIVE IMMEDIATELY! In addition, many parts of the country are experiencing severe drought conditions, and the

word from California is that rationing and 30% increases in water costs (never mind ever-stricter sewer discharge limits and costs) will take effect this summer!

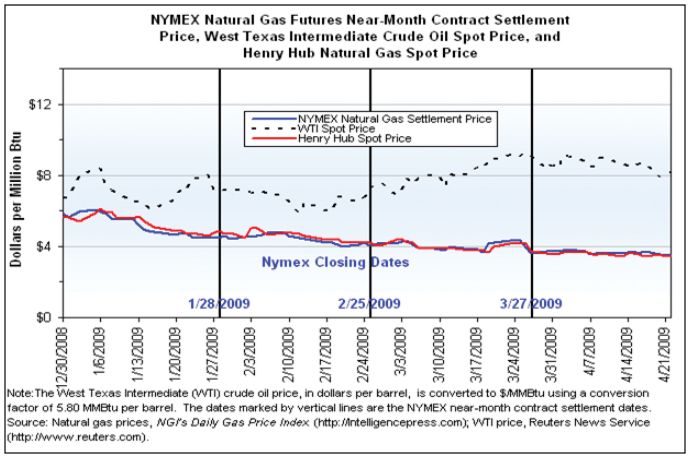
So water is expensive and getting more so, and natural gas is cheap ($4-$5 per MMBTU) (see graph below).

With the cost of gas being in the low single digits per 1 million BTU (MMBTU) and water increasing in cost, WHY do we use STEAM to heat our water, our equipment (ironers, etc.) and for that matter our buildings, etc.?

Well if you run an operating facility and take advantage of the "tried and true" energy-efficient equipment already at our disposal (heat reclaimers, stack economizers, vent condensers, water recycling, etc.) then you are one of the lucky, or should we say SMART operators. For existing plants, it may not make economic sense to replace all of your "steam heated" equipment. If you are in need of a NEW facility, or an expansion of your existing facility, or if you are retrofitting due to the age of your equipment etc., then it's time to look at the NEW technologies and strategies that have recently reached the United States.



This is a typical steam generator/boiler system with which we are all familiar.



Note that in the above diagram we not only have the inefficiency of a boiler (80% AT BEST), but the condensate system and associated steam traps are good for another 10%-15% decrease in efficiency. Now we are at 30%-35% less efficient! Add to that the need for an operator and associated permits, licenses, insurance coverage, annual inspections, etc. and you are left with an undesirable situation to say the least.

Energy-saving alternatives

If we use a direct-fired hot water heater to heat our water to whatever temperature is needed in the washroom (150°-180°F) and use the methods mentioned above (heat reclaimer, stack economizer, etc.) to preheat the incoming city water before the direct-contact heater is used, we can get 99+% efficiency in heating our water. Now we pump this water through conventional methods to the washroom and feed our washers (open-pockets, washer/extractors, tunnel/CBW washers, etc.) There is no need for steam.

For those of you who use tunnel washers, you're probably thinking, "I use tempered water (from a heat reclaimer) to use in my tunnel washer and then reuse the rinse water. I have to use steam to heat the recovered water from the rinse zone to 160+/-°F for my wash zone!" In that case, we'd ask you to consider this alternative: Continue to use tempered water as the main source of water for your washer. BUT when it comes time to reuse the "rinse water" USE a hot water heat exchanger with the 180°F hot water to preheat the rinse water and then inject the RESULTING 160°F rinse water into your WASH ZONE as you would with the normal rinse water! Your water usage doesn't go up and the industry-accepted one gallon per lb. (or less) remains intact.

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Remember, injecting live steam is a very expensive way to heat process water. Recovered condensate water is the most expensive (valuable) water in the plant—it has been softened, treated and heated once to create steam and then returned to the receiver for reuse at very high temperatures. When it is used for live injection to raise the temperature for the wash process, it is replaced with new, colder water that has to go through the same process again. According to the Department of Energy, reducing or eliminating "live steam" heating can save nearly 18% of fuel used to heat makeup water.

We know that you tunnel operators are now asking, "What do I do from a cold start?" or "How do I get 'temperature,' if the system has been sitting for an hour after a stoppage?" One approach is to add heat reclaimers for each tunnel, which use hot water or even hot oil to maintain temperature in process tanks (eliminating the steam injection into the washer) and thereby reduce the need for a "central boiler" for process water. Another alternative is to add a small "steam generator" and generate the steam needed for the initial start and momentary temperature requirements. In all cases, the plant's production profile will determine the best solution. For example, consider the use of a gas-fired "hot water" heat exchanger mounted on top of a batch washer.

Now lets talk about the finishing/ironing dept. (please note that this article is aimed primarily toward operators of linen or healthcare

plants.) For industrial operators the need for steam is more critical due to the need for pressing garments and finishing garments in the steam tunnel. Watch for an upcoming article from us on the pros and cons of a steam generator vs. a conventional steam boiler.

If you operate a facility with conventional steam ironers (Sylons, Super Sylons and Hypros) then the need for steam also is a critical factor. But there are strategies that you can consider that will help you USE LESS STEAM. We have a customer who added an additional tunnel washer to his plant to keep pace with growth. Even as he used tempered water at 120°F into the tunnel, he still was consuming over 1,200 lbs. of steam per hour in the tunnel to heat his water to the required 170+° F that he needed for his main wash zones. This direct-steam requirement affected his boiler in such a way that it limited his ability to add the additional Hypro ironing lines that he wanted to use for this new capacity.

To get around this problem, he decided to add self-contained gas-fired thermal fluid ironers that operated independently from his boiler. After six months, he noted his plantwide BTU/pounds processed had dropped nearly 8% with these new additions. He is now looking at process-water heat exchangers for his tunnel washers to further reduce his steam demand and also to recover more, if not all of his condensate return. (As we said, operators considering NEW facilities or retrofits should weigh the alternatives noted in this article.)

With the reintroduction of thermal fluid-heated ironers as self-contained systems and ever-lower water usage achieved through reuse and reclamation systems and continuous batch washers, an opportunity now exists to begin building or retrofitting high-production laundries as steamless or less-steam laundries.

The self-contained gas-fired ironer is the centerpiece of the steam-less laundry. For finishing/ironing of linen "self-contained" thermal fluid gas-fired ironers have been in the North American market for nearly 10 years and have proven to be reliable. Thermal fluid heating in laundries is not new, but with the latest generation of self-contained ironers it has enabled existing plants to expand production and operate independently of the main boiler or centralized thermal-fluid heaters. By operating on a demand basis, i.e., by only heating a production line when needed and at the correct temperature, a laundry can save a considerable amount of energy.

An interesting concept is using the exhaust from the self-contained ironers to preheat incoming process water. Clearly this presents an opportunity to capture more energy for reuse, but it also will require considerable maintenance of the air-to-water heat-exchange surfaces.

European steamless laundries

Now let's consider the situation in Europe and how steamless laundries are operating there. The idea of building a steamless, or better yet a steam–less laundry, is a growing trend in Europe. We estimate that there are 10-11 plants in operation and more on the drawing board. In light of the issue of greenhouse gas emissions and the coming limits on CO^2 emissions for industrial processors—European operators and manufacturers are working together to explore every avenue for energy reduction and potential compliance with upcoming regulations. By eliminating steam boilers, these facilities are gaining recognition as moving in the right direction. But beyond the marketing of "lower carbon footprint and emissions," it appears that this move can generate real operational and initial-construction savings.

Laundries throughout Europe are claiming a 30%-50% reduction in comparable energy-to-conventional steam facilities. As we said, steam is mainly used for flatwork ironing and process water heating inside batch washers. A typical steam laundry in Europe will utilize steam pressure of 12-13 bar steam (175-190 psi), so the costs for process steam are quite high. The steam piping also has a considerable initial cost. Because most of Europe still uses a considerable amount of 100% cotton and cotton-blend textiles, higher process temperatures for washing and finishing are required. In North America, where synthetics dominate the market (except in high-end hotel and hospitality), the process temperatures are very different—and so is the energy requirement.

We have seen reports of healthcare laundries that process 72,000 lbs. per day without the use of a conventional steam boiler. This indicates a comparable energy-cost reduction of 125,000 Euros per year (about $170,000) at today's costs. Given the lower process temperatures in North America, these savings may not be as dramatic. Nonetheless, they are worth considering, if you're a U.S. operator who's looking to renovate or build a new facility.

Change fuels opportunity

Thinking about breaking the mold in conventional energy usage within linen processing is a challenge, considering that the energy profile of a plant in Florida is quite different than one in Wisconsin. Nearly every linen plant of 2,000 lbs. per hour or more uses a steam generator or conventional high-pressure boiler as the primary energy source for flatwork ironing, garment finishing and process water.

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