May 2001

plantengineering.com

Single copy $10

PLANT ENGINEERING

Improving pipe thermal maintenance performance with bolt-on jacketing

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Key concepts

Jacketing is used to maintain temperature, not reach it.

Bolt-on jacketing has lower initial and life-cycle costs.

Jacketing should not cross-contaminate the product.

Maintaining the proper temperature in process lines remains a vital issue in difficult, hot chemical processes. At stake in the solution is product integrity, throughput, freedom from production interruptions, and risks of cross-contamination between the process stream and heating medium.

Plant engineers have three principal heating options — tracing, fabricated jacketing, and bolt-on jacketing. Which option provides the best performance and lowest installed cost?

Unless it works right, the price can be several times the cost of the jacketing in a year — sometimes with just a single line freeze — in lost production, maintenance, and degraded product. Heating process lines requires careful attention, especially when tight temperature tolerances above 200 F must be held. It's even more important where cross-contamination between process and heat transfer fluids cannot be tolerated.

Remember that the principle purpose of jacketing is maintenance of temperature in the line, not heat-up. There is a big difference. That's why the term "thermal maintenance system" is used. It takes a lot less heat input to maintain constant line temperature than to heat it up in the first place.

Too many engineers overlook this fact, and place too much emphasis on recovery rates when evaluating thermal maintenance alternatives. They say the jacketing must get the line back to temperature immediately after a shutdown. While the system must have effective startup/melt-out capability, it is a matter of efficiency.

Rarely is jacketing — fabricated, bolt-on, or trace — the bottleneck to getting back up after a shutdown. Bolt-on jacketing has proven the equal of fabricated jacketing for thermal performance in difficult applications. It also pays dividends with about 25% lower initial cost and lower life-cycle costs for the components it protects. In addition, bolt-on jacketing eliminates the chance of cross-contamination.

Inexpensive electric or steam tube tracing is usually adequate for forgiving applications such as freeze protection with broad temperature ranges and moderate service temperatures. At higher temperatures, differential expansion can cause tracing lines to warp and pull away from the pipe, causing cold spots. Sen-

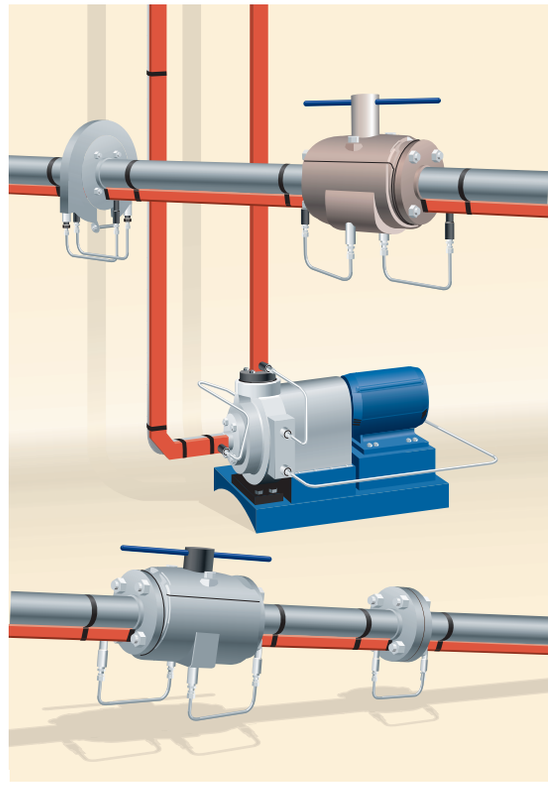

Fig. 1. Typical bolt-on fabricated jackets protect valves, pumps, and meters.

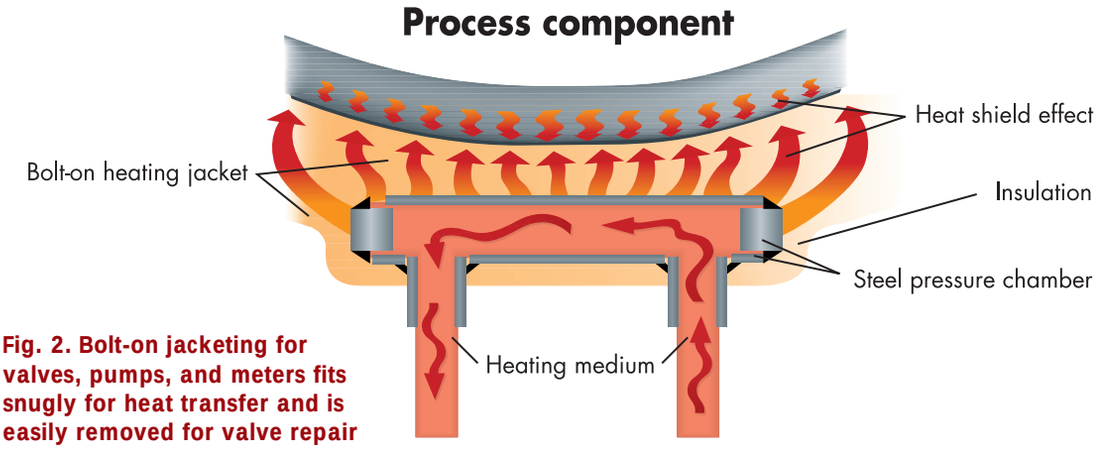

Fig. 2. Bolt-on jacketing for valves, pumps, and meters fits snugly for heat transfer and is easily removed for valve repair or changeout.

sitive processes require the incrementally greater thermal performance of high-integrity fabricated or bolt-on jackets, or a combination of both.

But, for the majority of difficult cases, bolt-on is equal to the task. The choice between a fabricated or bolt-on system should be based on comparative cost and risk of cross-contamination.

Typical bolt-on heating systems consist of jackets for components such as valves, pumps, and meters (Fig. 1); and heating elements for piping and vessels. The component heater is made of an aluminum casting with a steel pressure chamber embedded inside the aluminum (Fig. 2). Heat is transferred from the heating fluid contained in the pressure chamber through the casting, which fits the component like a second skin. The pipeline heating element is a basically rectangular tube with one surface contoured to closely fit the outside of the pipe or vessel (Fig. 3).

In difficult hot processes, the use of bolt-on thermal maintenance systems has doubled over the past decade, replacing custom-fabricated jacketing. Less costly than fabricated jackets, bolt-on component jackets are easy to install and remove for maintenance or component changeout. In addition, with an independent barrier between heat transfer and process fluids, bolt-on elements provide security against cross-contamination. Industry standard bolt-on component jackets are available to fit more than 4000 models of valves, pumps, and meters.

Instead of stocking expensive, permanently-jacketed valves and pumps, users of bolt-on elements can stock standard components at a fraction of the cost and simply switch the jacketing when necessary. In punishing hot processes requiring frequent replacement of valves, pumps, and meters, bolt-on solutions can cut spares costs by up to 50%.

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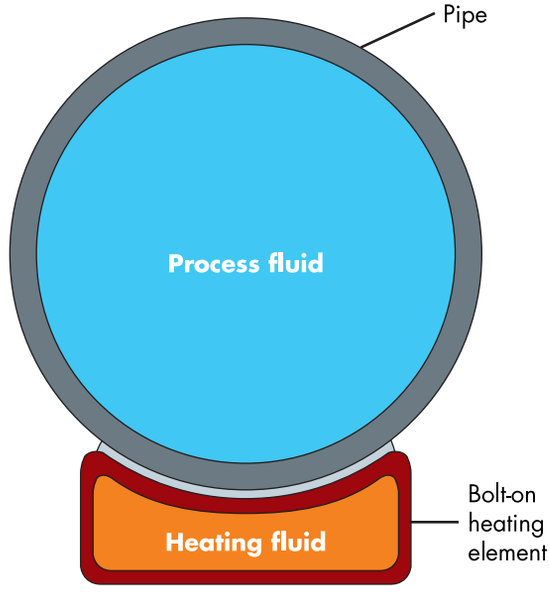

Fig. 3. Bolt-on heating elements detach from piping for maintenance and repair and cost less than custom fabricated jacketing.

More info

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