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The hidden treasures of heat recovery

Mineral processing

The secret is thermal efficiency

There are many reasons why a heat exchanger from Alfa Laval is able to recover so much more energy than any shell and tube unit.

By definition, the turbulence of the media in a plate heat exchanger is much greater than in the shell-and-tube. This results in a higher coefficient of heat transfer.

In shell-and-tube exchangers, the media has to travel through the tubes, which means the fluid residence time is much greater. This means that much of the energy is dissipated as heat through the tube walls.

The plate heat exchanger has no tube walls, so all the energy is extracted from the fluid itself.

It’s a fair question. Especially when considering the advanced alloys involved. They cope with 180°C – while dealing with the high temperatures involved. They are the object of negative “common wisdom” concerning their durability.

Every so often, plate heat exchangers are replaced more frequently, at great expense? The truth is that Alfa Laval has refined heat exchangers are designed to handle very coarse, fouling slurries at high temperatures and/or high pressure.

Counter-productive scaling and fouling – and, by the same token, the need for more cleaning – a job that’s supposedly much more complicated and resource-consuming. Not true. All Alfa Laval’s gasketed, welded and spiral units are easily accessible for both solid side for high-pressure cleaning. And there is a side clean of plate designs – all optimized for specific processes and fouling issues, to reduce the cleaning need in the first place.

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The single-channel design of spiral heat exchangers makes it easy to control thermal efficiency and thereby avoid fouling and scaling issues. Our service and spare-part centers worldwide, minimizing the distance and time to repair.

From Australia to Canada, from Jamaica to Russia, from Zamb;i to Chile.

Heat exchangers from Alfa Laval are uncovering hidden treasures in mineral processing plants across five continents. And Alfa Laval’s technical service and experience as a supplier to those plants is extensive.

Nickel

Nickel is a key input in the production of nickel metal. The metal is used in many applications, from automotive parts to high-performance electronics. Nickel is a valuable commodity, and maximizing its recovery is crucial to the profitability of nickel refineries.

Compact heat exchangers from Alfa Laval are recovering high-quality nickel from nickel broths at high temperatures. They are used in the production of nickel metal, ensuring high yields and maximizing the value of the nickel.

Copper and zinc

Nearly 250 heat exchangers from Alfa Laval are recovering heat from the leaching and electrowinning processes in copper and zinc production. These processes typically operate at high temperatures and pressures, making heat recovery a challenging task.

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Why are conventional shell-and-tube heat exchangers still commonplace in mineral processing plants?

It’s a fair question. Especially when considering the huge energy savings they are hiding. Replacement with compact heat exchangers from Alfa Laval – gasketed, welded or spiral – will help uncover these hidden treasures along the entire extraction process from ore to pure metal.

Welcome to the lucrative world of heat recovery.

The secret is thermal efficiency.

There are many reasons why a heat exchanger from Alfa Laval is able to recover so much more energy than any shell-and-tube unit.

By definition, the turndown of the media in a plate-and-tube exchanger is much greater than in the shell-and-tube and welded types giving them the ability to recover more heat. Also, by definition, the temperatures at the two sides in a plate or spiral heat exchanger are higher than in the shell-and-tube, that can be used in compact heat exchangers.

It also shrinks their dimensions and components to the fraction of shell-and-tube units with compatible performances.

No more tubes.

The principle of crossing temperatures is the object of the negative “common wisdom” concerning their durability and serviceability. Despite their superior thermal performance, despite their ability to recover enormous amounts of energy, despite their small footprints. Despite their stringent record around the world.

When it comes to mineral processing, many people still hesitate to trust them. Perhaps it’s time to disclose this “common wisdom” that this hesitation is founded on:

Heat resistance.

Leaching nickel ore generates large amounts of hot steam which can be recovered, condensing and fed back to the incoming flow.

Despite contrary “common wisdom”, plate heat exchangers have no problem dealing with the high temperatures involved. They cope with 180°C – while sprial units are designed for up to 400°C.

Gaskets.

Another hesitation relates to the gaskets of plate heat exchangers. Can they really cope with the aggressive, heavy-duty mineral processing environment?

No. Alfa Laval offers three types of heat exchangers: welded, spiral and gasketed. Each is optimised for specific duties and operating conditions. Despite different designs, they are all equally acceptable for cleaning and maintenance. In fact, a spiral unit using steam as heat source can clean itself by simply inversing the two flows.

The Alfa Laval spiral heat exchangers because they are not limited in any way, not only to the thermal efficiency in high pressure signal, the compactness runs very close to a high-level performance.

Alfa Laval spiral unit has no problem recovering the energy from the high turbulence created by the plate corrugation, keeps the scale suspended. The plates are very strong and very easy to clean. Thanks to sophisticated design, very gasketed plate exchange, regardless of size, can be opened, cleaned and closed again by a single person. It’s quick, safe and effective.

The single-channel design of spiral heat exchangers makes it easy to control viscosity and thereby avoid fouling and clogging in duty duties.

Killing a few myths about compact heat exchangers

Every on-plate, plate heat exchangers are the object of the negative “common wisdom” concerning their durability and serviceability. Despite their superior thermal performance. Despite their ability to recover enormous amounts of energy. Despite their small footprints. Despite their stringent record around the world.

So, let’s debunk these myths.

1. Are Alfa Laval compact heat exchangers suitable only for water-based fluid systems?

Not true. All Alfa Laval’s gasketed, welded and spiral units are fully optimised for water at high-pressure levels. And there is a wide variety of plate designs – all optimised for specific processes and fouling risks, to reduce the cleaning need in the first place.

2. Can the high turbulence created by the plate corrugation, keep the scale suspended, and the heat exchanger clean? Thanks to sophisticated design, every gasketed plate exchanger, regardless of size, can be opened, cleaned and closed again by a single person. It’s quick, safe and effective.

3. The single-channel design of spiral heat exchangers makes it easy to control viscosity and thereby avoid fouling and clogging in duty duties.

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Heat exchangers from Alfa Laval are uncovering hidden treasures in mineral processing plants across five continents. And Alfa Laval’s technical know-how and experience – as a supplier to these plants is extensive.

Avalon

Avalon’s first installation in an alumina refinery goes back to 1956. Over 200 heat exchangers have much more complicated and resource-consuming. Not true. All Alfa Laval’s gasketed, welded and spiral units are fully accessible and easy to open for high-pressure cleaning. And there is a wide variety of plate designs, all optimised for specific processes and fouling risks, to reduce the cleaning need in the first place.

In reality, the high turbulence created by the plate corrugation, keeps the scale suspended and the heat exchanger clean. Thanks to sophisticated design, every gasketed plate exchanger, regardless of size, can be opened, cleaned and closed again by a single person. It’s quick, safe and effective.

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Global partner

With our network of more than 50 service centres around the world, we are always close to our customers, regardless of where in the world they do business. The means we can respond faster to their needs and inquiries. Our process specialists can advise our customers about materials, gaskets and services in their local language. Alfa Laval’s service organisation can ensure the right maintenance and future of safe and effective.

The Alfa Laval’s gasketed, welded and spiral units can be designed to handle very coarse, fouling-tolerant fluids, to reduce cleaning need in the first place.

With an Alfa Laval double-pass spiral unit with counter-current flow, you can exclude the heat-exchanger’s expansion, to reduce cleaning need in the first place.

The Alfa Laval spiral unit uses special heat exchangers because they are not limited in any way, not only to the thermal efficiency in high pressure signal, the compactness runs very close to a high-level performance.

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The hidden treasures of heat recovery

Mineral processing is a fascinating process, but it can also be a costly one. One of the areas where significant cost savings can be made is in heat recovery. Properly designed heat recovery systems can reduce energy consumption, which in turn reduces costs and improves efficiency.

We often think of heat recovery in terms of large industrial plants, but even small-scale operations can benefit from it. The key is to understand the principles behind heat recovery and to implement them in a way that makes sense for your specific application.

Heat recovery systems work by capturing and reusing heat that would otherwise be wasted. This can be done in a variety of ways, depending on the specific application.

One common method is the use of heat exchangers. Heat exchangers work by transferring heat from one fluid to another, typically by way of a solid surface. This allows the fluid that is being heated to heat up quickly and efficiently, without wasting energy.

Another method is the use of waste heat boilers. These are essentially heat exchangers that are designed to extract heat from waste gases, such as those produced by industrial processes. The heat from the boiler can then be used to generate steam or to provide heating for other purposes.

Heat recovery systems can save money in a variety of ways. By reducing the amount of energy needed to heat up new fluids, these systems can help to lower operating costs. Additionally, by reducing the amount of energy that is lost to the atmosphere, heat recovery systems can help to improve overall environmental performance.

In summary, heat recovery is an important area of mineral processing. By understanding the principles behind heat recovery and implementing them in a way that makes sense for your specific application, you can save money and improve efficiency.
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