FOOD MANUFACTURING™

TODAY'S TECHNOLOGY FOR FOOD PRODUCTION & PACKAGING

FEATURED INSIDE

Virtual Reality Training Software For PLC

Rod's Food Products Inc. needed a tool to train its maintenance staff in the intricacies of PLC operation and troubleshooting. The Automation Master Training Models, provided by HEI Corp., allowed a trainer to cover nearly all of a PLC's capabilities without the risks involved with training on real-world equipment.

Direct Steam Injection Heating

When a food product manufacturer replaced a single tank system with direct contact steam injection, the result was uniform cooking and a homogeneous solution for saccharification, as well as a complete cook-out of starch, resulting in maintenance free operation.

Handheld Baking Contrast Meter Ensures Consistency

The economical, multi-functional, handheld BC-10 Baking Contrast Meter measures the color of baked, fried, and processed foods, as well as ingredients, in various environments to ensure consistency in appearance. The meter is able to target applications within the baking and allied trades' industries where mass production of food demands strict adherence to specifications. Besides crust color, the BC-10 measures color in most bakery and snack food products, block yeast, brown sugar, calcium propionate, and flour blending. All the user needs to do is place the meter on the sample and press a button. The LCD display shows the minimum, maximum, and mean computation on the last 16 samples to confirm whether the color is acceptable. **Minolta Corp.,** 101 Williams Dr., Ramsey, NJ 07446.

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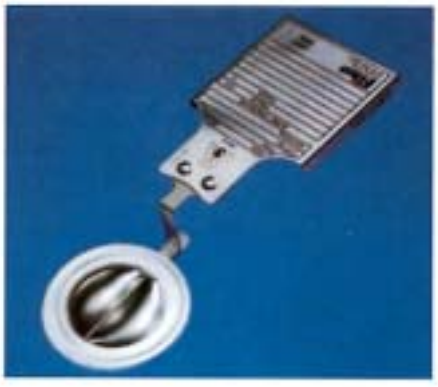


Rupture Disc Is Suitable For Liquid, Vapor and Two-Phase Flow Applications

Portable Bulk Bag Unloaders Feature Integral Conveyors

Direct Contact Steam Injection Offers Savings

The prospects for precise temperature control, reduced energy consumption and more efficient maintenance costs paint an inviting picture for food processors concerned with product quality and consistency and operating expenses.

Applications for direct contact steam injection heating include its use for central hot water systems, as a source for heat exchangers, for in-line processing and uniform liquid heating in diverse temperature and production environments.

Direct contact steam injection allows companies to complete entire CIP cycles within considerably tighter time tolerances.

These are the primary inducements afforded processors through the application of direct contact steam injection heating. It is a method and technology often overlooked or not used to full advantage by food processors who are unaware of its full potential in sanitary applications. While the technology is not exclusive to the food industry, it does offer processors in this field distinct, measurable benefits in terms of cost savings and product uniformity - key ingredients that shape a company's reputation. Recent advancements, including the introduction of compact new designs, have made the technology more accessible and applicable than ever before. This makes the understanding and evaluation of direct contact steam injection heating more important for both new and existing facilities.

Contact Categories

There are two basic types of heat exchangers - direct and indirect - used

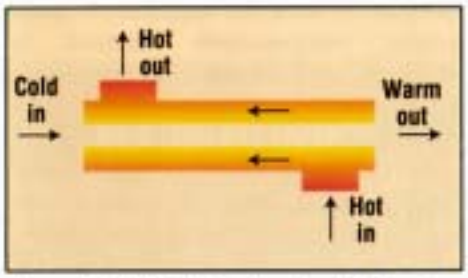


Figure 1. Single tube indirect contact heat exchanger.

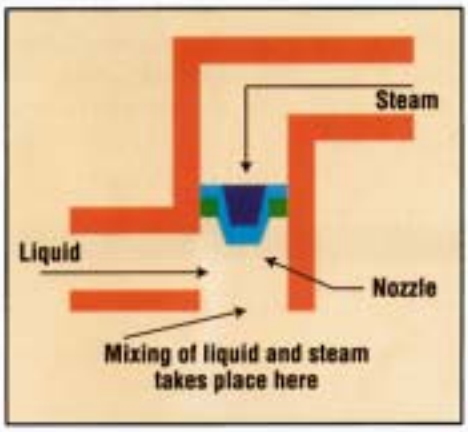


Figure 2. Basic direct contact steam heating.

to transfer heat between process mediums. Generally speaking, indirect contact heat exchangers have two fluid flow paths which do not directly mix the fluids. They promote the transfer of heat from one fluid to another across a thermally conducting, but otherwise impermeable, barrier such as a pipe wall. (See Fig. 1)

Direct contact heat exchangers rely on steam from a plant's steam supply. They transfer heat by injecting precisely metered amounts of steam into the process fluid (liquid or slurry) which needs to be heated. Unlike conventional indirect heat exchangers, this process injects steam directly into the process fluid, resulting in more rapid heat transfer and more efficient energy use. (See Fig. 2) Energy saving can be considerable. Reductions in the 20-25 percent range are not uncommon.

There are other attendant benefits from the direct contact method, and they deliver in terms of plant layout and maintenance. Both equipment expense and space requirements can be trimmed, because the direct contact steam injection method eliminates the need for the condensate return systems required with indirect exchangers, while generally utilizing less space.

Food Processing/ Food Manufacturing Uses

Whether evaluated from standpoints of product quality, energy and cost saving potential or increased efficiency - or a combination of benefits - sterilization, heating or other applications, opportunities for the effective use of direct contact steam injection heaters abound in food processing plants. Additionally, processors in the meat industry, canned, glass packed and frozen food segments, have successfully applied the technology and realized numerous benefits. Clean-In-Place systems or heat transfer of water miscible liquids and slurries have been enhanced. Other applications for direct contact steam injection heating include its use for central hot water systems, as a source for heat exchangers, for in-line processing (in some cases eliminating batch processing altogether) and uniform liquid heating (of starches and slurries up to 35% solids) in diverse temperature and production environments.

Companies generally derive multiple benefits from utilizing direct contact steam injection heating. A food product manufacturer, for example, seeking a reliable method to cook corn starch in the liquefaction stage, replaced a single tank system with direct contact steam injection. (The single tank system, with a static mixer downstream encountered continuous downtime due to plugging and fouling.) The replacement system enabled the food processor to ensure uniform cooking and a homogeneous solution for saccharification, as well as providing a complete cook-out of starch, resulting in maintenance free operation. The company also was able to completely eliminate the static mixer from its process line.

Another application involved direct contact steam injection for a critical Clean-In-Place operation. This processor of cheese products had experienced significant difficulties cleaning a separator at this plant. The previous method involved extended cleaning times and increased chemical usage to adequately CIP the separator. Replacement systems that were originally specified included a single tank system using a shell and tube heat exchanger.

However, this approach required the addition of a condensate return system not available in the system's present location. With direct contact steam injection, desired temperature levels of 190° F are now attained in addition to extremely accurate temperature controls of plus or minus 1/2° F. The direct contact steam injection has also allowed the company to complete the entire CIP cycle within considerably tighter time tolerances.

Another CIP application for a U.S. brewery provides efficient heating of circulated water and solutions for cleaning filler lines. The system has addressed previous problems of excessive hammering during operation and provided precise control of loop temperatures. Maintenance and downtime costs have dropped sharply.

Direct Contact Heating Methods

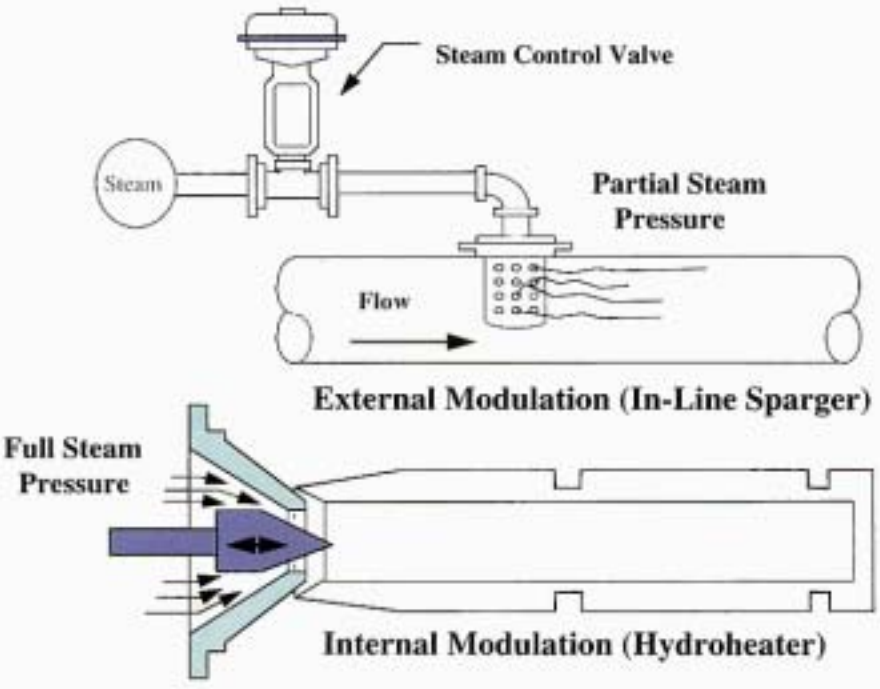
Several direct contact heating methods are used today, including externally modulated devices such as tank spargers, in line spargers, mixing tees or eductors, and internally modulated steam injection

heaters. While each of these types of heaters offers basic time and space advantages of direct contact steam heating, each has distinct differences. Some direct contact steam heating methods have limitations which make them suitable for some applications and unsuitable for others. All methods of direct contact steam heating either operate as an externally or internally modulated system. This defines how the amount of steam injected into the process fluid is controlled.

Application Specifications

Specifying direct steam injection heating and sizing the proper unit for an application requires an examination of process requirements. General application information is needed, along with a description of fluid characteristics. Are abrasive or corrosive products involved, etc.? Other fluid properties must be taken into consideration, including specific gravity, density, percent of solids, heat requirements, and viscosity. Application conditions, such as flow rates under normal and maximum conditions and pipe sizes, must be examined. The same holds true for inlet and discharge temperatures and pressure. Users should also determine whether manual or automatic temperature control is desired, and whether continuous, intermittent or variable operation is the norm.

This, along with other application details, will help determine the heater to deliver maximum performance and benefit - both short-term and long-range. Like the temperature rise and control they deliver to the process, the heaters' results can be seen and measured quickly. The gains in increased operational efficiency and reduced maintenance will pay dividends for years to come.



Example of internal and external modulation.

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