

# Direct Steam Injection Heaters

## Case Study

**Challenge** Conventional storage tanks with sparge pipes (simple pipes with drilled steam distribution holes) tend to have uneven water temperature control, steam hammer, heavy vibration caused by collapsing steam bubbles, and low efficiency. The steam temperature control valve also 'hunts' when approaching the water temperature set point due to the reduced steam pressure.

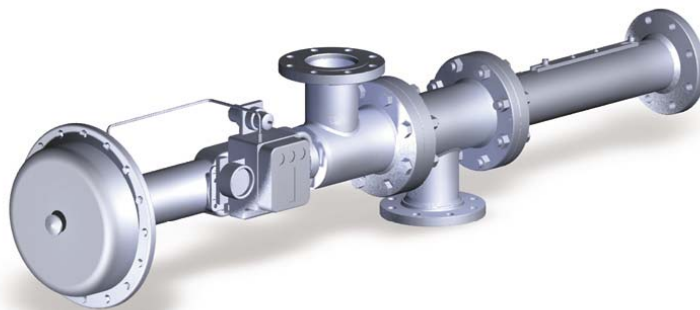
**Solution** Kadant Johnson designed a direct steam injection heater that rapidly and accurately heats liquids by injecting steam directly into the fluid inside a mixing chamber. The direct injection heater provides two options to the above problem:

1. Replace the sparge pipe with a direct injection heater. The water in the storage tank is circulated through the direct injection heater to maintain the desired temperature set point for the water in the tank
2. Replace both the sparge pipe *and* the storage tank and use the direct steam injection heater to provide hot water on demand.

**Results** A direct steam injection heater eliminates both the storage tank and the sparge pipe; controls the water temperature within +/- 1° F; eliminates steam hammer, thermal noise and vibration; and reduces the amount of steam required to heat the water by 30%. A direct steam injection heater requires minimal space in contrast to the storage tank/sparge pipe arrangement.

### Highlights

- Direct steam injection heaters can be used in place of sparge pipes.
- Direct steam injection heaters save on energy by reducing the amount of steam lost to the surroundings.
- Direct steam injection heaters provide consistent and accurate water temperature control.



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