

# ThermoMax® Steam System

Efficient. Reliable. Consistent.



- Modern steam systems for modern corrugators
- Maximize energy efficiency, reliability, and corrugator productivity

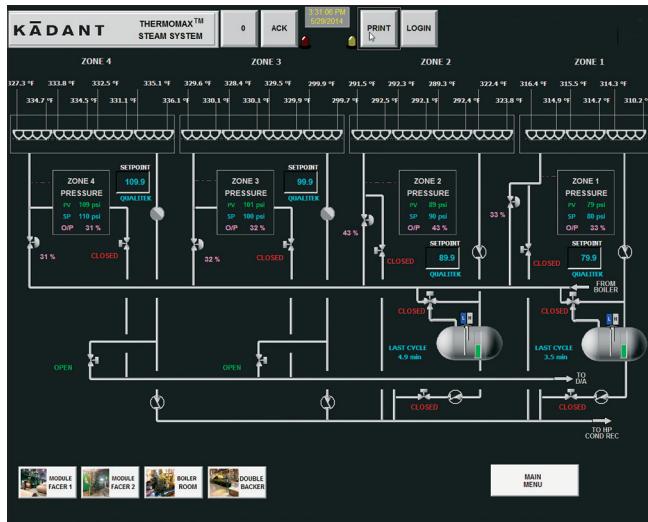
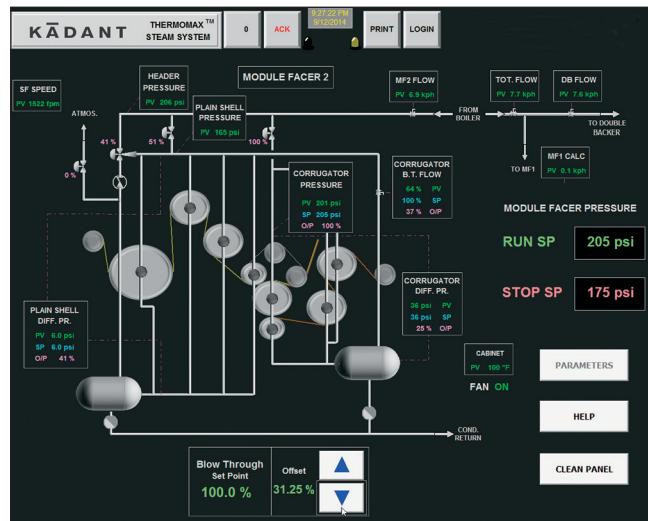
# Maximize Heat Transfer

## Temperature and Pressure Control

A trapped system can provide high-energy efficiency, but may not optimize heat transfer and production. The objective of a trap is to eliminate steam losses and only remove condensate. However, in a high-speed condensate removal system, blow-through steam is required to efficiently evacuate condensate and produce high-heat transfer rates.

The Kadant Johnson ThermoMax® steam system optimizes heat transfer, production, quality, and energy efficiency.

The first priority of a corrugator steam system is to provide maximum temperature at the liner and medium interface for glue bonding. The ThermoMax system provides maximum steam pressure to the corrugator rolls and two preheater rolls that immediately precede them. Pressure control is incorporated for corrugators making light weight flutes requiring lower temperatures.



A PLC provides visibility into the system leading to greater control and reduced maintenance requirements.

# Steam System Optimization

The two basic functions of a corrugator steam system are to:

- Distribute steam efficiently to each steam-heated roll and section of the corrugator
- Remove condensate rapidly so it does not inhibit the heat transfer capability of the system

In doing so, a proper steam system:

- Delivers dry steam at the desired pressure to every vessel
- Continuously removes condensate as it forms
- Delivers low-pressure wet shower steam to precondition the medium
- Provides a means to purge non-condensable gases (primarily air) from the system during startup
- Automatically handles large heat load variations ranging from a stopped corrugator to one producing heavy weight double- or triple-wall at high-speed
- Accomplishes these functions reliably and efficiently with minimum maintenance requirements

## The Kadant Johnson Difference

Unlike conventional corrugator steam systems, the ThermoMax steam system controls the differential steam pressure and blow-through steam across each roll to achieve the highest possible heat transfer and temperature uniformity, with higher efficiency and less maintenance than any conventional steam trap system.

Unique features include:

- The ThermoMax steam system is designed specifically for the application to increase machine responsiveness and system visibility. Decades of experience and research on the heat transfer from steam-heated rolls uniquely positions Kadant Johnson to address the problems other steam systems encounter when varying heat loads and operating at various speeds.
- System design is linked to the performance of all the system components including rotary joints, syphons, heat transfer Turbulator® bars, and thermocompressors
- Kadant Johnson technicians provide regular on-site support for process evaluations, upgrades, installations, and optimization

Features	Benefits
 <ul style="list-style-type: none"><li>• Tight integration of steam system with steam joints, syphons, and related components</li><li>• Blow-through differential control</li><li>• Thermocompressor steam booster</li><li>• Elimination of steam traps</li><li>• Simplified control</li></ul>	 <ul style="list-style-type: none"><li>• Maximum heat delivered to the liner and medium</li><li>• Maximum steam efficiency and control</li><li>• Fast heat-up of system</li><li>• Reduced maintenance requirements</li><li>• Optimized energy use</li></ul>

## High-Speed Corrugating Using Peripherally Drilled Rolls

Testing at Kadant Johnson's W.R. Monroe Research Center has shown that the velocity through the drilled passages is critical for drilled corrugator rolls operating at high speeds. Too little blow-through steam will cause poor heat transfer and mechanical instability in the rolls. This condition is termed "condensate stall". Using too much blow-through steam increases the pressure drop and reduces the heat transfer capacity of the drilled roll as well as down-stream heating components.

### Heat Transfer Maximization

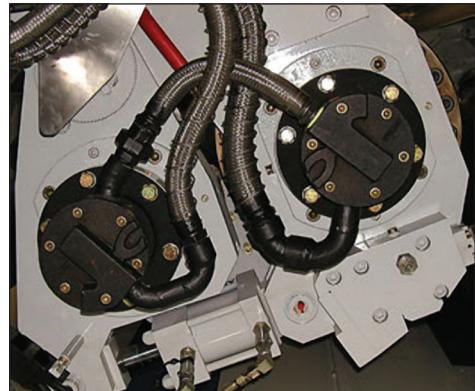
High-heat transfer is needed from the liner and preheater and medium preconditioner rolls for high-speed production of heavy weight board combinations. Kadant Johnson CorrPro® rotary joints, Turbulator bars, and advanced stationary syphons are used to produce the highest possible roll temperatures. Optimized siphon clearance, differential pressure, and blow-through steam flow are needed to maximize heat transfer and provide uniform cross-directional temperature profiles.

### Blow-Through Steam

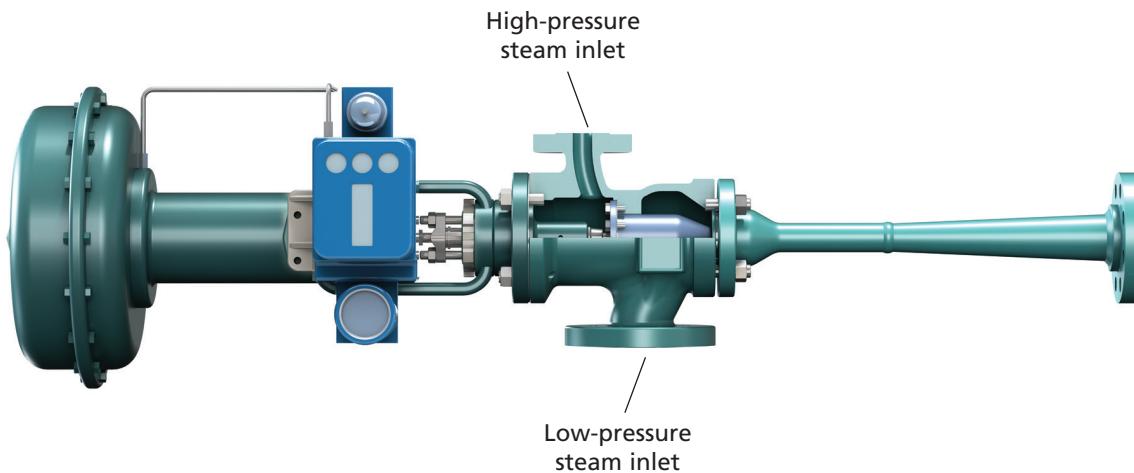
Blow-through from the rolls with stationary syphons and steam system balance are maintained by matching the system design to the flow characteristics of the syphons. Kadant Johnson supplies both the hardware and the system components to achieve the required blow-through steam flow and condensate drainage.

It is important to provide proper separation of the blow-through steam and condensate that is removed from the rolls. Condensate tanks are used to provide efficient separation. These tanks are designed to achieve over 98% steam quality leaving the tank. The condensate level in the tanks is actively controlled by a level-control valve. Conventional traps cannot provide reliable control of the condensate levels in the separator tanks.

Blow-through steam from the separator is recirculated and recompressed using a high-efficiency Kadant Johnson thermocompressor. The thermocompressor allows for the reuse of blow-through steam and provides high-energy efficiency. Computational fluid dynamic (CFD) modeling of the thermocompressor provides the highest possible efficiency.



Kadant Johnson CorrPro rotary joints installed on corrugating rolls.



Kadant Johnson high-efficiency thermocompressor

Dimensions are for reference only and subject to change.