

Thermocompressors - Love 'em or hate 'em

Fulton Systems, Norcross, GA, has supplied thermocompressors to the paper industry for over 50 years. The principal reasons for installing them are:

- To reduce energy consumption.
- To increase paper machine drying capacity.
- To improve dryer section operating flexibility.

Understanding the basic principals of design and operation of thermocompressors is essential to loving them; misunderstanding leads to hating them.

For recirculating applications, the blowthrough steam from a dryer or dryer section is recompressed for recirculation to the supply header. Thermocompressors are designed to satisfy two sets of conditions:

Steam pressures and flows for the maximum drying conditions, usually the conditions for the heaviest, slowest running grade

Steam pressures and flows for the minimum drying conditions, usually the conditions for the lightest, fastest running grade.

As a rule, the throat in the diffuser is determined by the minimum conditions and the bore of the nozzle is set by the maximum conditions. These two conditions lead to two unique designs. Expertise is needed to engineer the optimal design which integrates both the maximum and minimum conditions, as well as all other run conditions. Since compromises must be made to address the various run conditions, it is essential that safety factors are not applied to any of the drying condition specifications. Simply, safety factors lead to a greater range of design conditions, which leads to a greater compromise, errant sizing and poorer performance at true operating conditions.

Properly sized and functioning thermocompressors will operate in the approximate range of 20 - 80% open. A thermocompressor in the fully open or closed position during run conditions is usually a problem. The first step should be to verify the instrumentation and controls, as this is the most frequent source of a problem. Next, verify that the thermocompressor is operating within its design range (system operating or equipment changes may cause the required range to exceed the design range). Finally, contact a reliable thermocompressor supplier.

Some changes that may cause a thermocompressor to fail to operate within its design range are:

- A new type or size of siphon
- An increase in machine speed
- New paper grades, particularly lighter or heavier ones
- A change in motive steam pressure or differential pressure
- Thermocompressor wear from entrained condensate
- Leakage of motive steam into the low-pressure chamber.

Some steam and condensate system deficiencies that affect thermocompressor performance are:

- Poor piping sizing or installation practices Insufficient separation of the blow-through steam and the condensate being discharged from the dryers
- Improper location of the thermocompressor
- Poor or infrequent checks of instrumentation and controls.

The above discussion applies to recirculating thermocompressors on paper machines and Yankee dryers but it is also relevant to booster thermocompressors. However, the latter application differs significantly from recirculating ones and additional expertise is required for these applications.

In the end, when thermocompressor are properly sized and applied you'll love 'em.

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