

Application**brief**

Eclipse Product: ThermJet Burners
Submitted by: Jim Benedict, Heat Process & Controls, Inc.
Application: Limestone Heater for the Asphalt Shingle Industry

Description: The making of asphalt shingles begins with the application of a hot mixture of asphalt and finely ground limestone to a moving mat of organic or fiberglass material. The limestone is heated and then pneumatically conveyed to a mixer where the limestone is mixed with hot asphalt at a ratio of approximately 65% limestone to 35% asphalt and maintained at a temperature of 380°F.

The industry has traditionally heated the limestone indirectly with heat exchangers such as hollow flight rotary screws and fixed exchangers located in a fluidized bed. The exchangers are fed with circulating high temperature thermal fluids. This method of heating has historically had a number of drawbacks, such as:

- Generally, the highest temperature obtained on the limestone is 280°F. This then requires an asphalt temperature of 500°F which is the point where the asphalt begins to degrade and light ends are driven off (an environmental issue).
- This method of heating is a relatively slow process and on a cold start-up, by the time everything equalizes such as correct temperature, line speed, etc., they can make scrap for 30 minutes to an hour. A rather costly proposition.
- Thermal fluid systems are at best 65% - 70% efficient. Along with this, the maintenance of pumps, exchangers and rotary joints is always ongoing.
- Generally the thermal fluid heater is located outdoors and, again for environmental issues, must be located within a catch basin.

Some years ago, a local roofing plant had appropriated the funds to install a limestone heating system similar to that described above. This project was turned over to a bright young engineer who just felt there had to be a better way to heat the limestone. He contacted Heat Process & Control, as we had worked with him previously on a couple of successful projects. The engineer felt this product could be heated by introducing it into a hot stream of air but was concerned about the potential high backpressure of 5 to 7 psig. We assured him that his should not be a problem as we had designed similar applications for fluidized beds.



ThermJet Burner mounted on limestone heater

We presented them with a proposal for the complete heater, which included an insulated chamber that resembles a coke bottle. The burner was a 104TFB-HC, selected for fixed air operation. The valve train included all Eclipse components. Air to be heated is introduced tangentially at the burner end of the heater. Both the combustion air and the air to be heated was provided with a positive displacement blower.

Approximately one week after presenting this proposal, the engineer called and advised our price was only seven percent of the money appropriated and management said it was too good to be true and couldn't possibly work! He also added that the plant engineer had basically committed the order to the company from which the appropriation funds were derived. We met with the young engineer who was on our side and seemed willing to push our ideas. We proposed, with their help, to build a test unit to prove the system would work. Heat Process would provide the combustion system if they would provide some semblance of a combustion changer. They found an old cement mixer that was about the right size. It was agreed, that if we proved our system, they would go ahead and purchase a heater that included the combustion system we put up for the test. The test went better than anyone could have imagined, including us, since it really was sort of a Rube Goldberg setup. They were so impressed that two systems were purchased in lieu of one. This was quite a few years ago and we have since sold five more units to other plants owned by the same company. These heaters were much larger so a 328 MVTA burner was used on three of the systems, and the most recent two are using 750 and 1000 ThermJet burners. Shutoff valves, flow orifices and ALO valves are Eclipse, where possible.

The resulting value to the customer is:

- The limestone is heated almost instantly, allowing the line to be up and running with very little scrap being produced.
- The limestone is heated to 400°F, allowing the asphalt temperature to be reduced, which now eliminates degradation of the asphalt, and light ends being driven off.
- The higher limestone temperature also allows a higher ratio of limestone to asphalt, which is now 70% limestone and 30% asphalt. At \$200/ton of asphalt, it amounts to substantial savings.
- Our system is heating 32 to 35 tons limestone per hour and operating at 75% to 80% efficiency.
- It's estimated that this direct heating method versus the indirect is saving the customer approximately 1.2 million dollars per year.

The new ThermJet burner, operating with fixed air, performs very well on this application.



Overall view of heater



Eclipse Combustion

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