

# Steelman Industries Gas-Fired Ovens for Safe, Economical Cleaning of Spinnerettes and Packs

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Most Pack Room production managers will agree that dirty spinnerettes can cause major headaches for their quality control. However, they may not agree on the best way to clean them.

There are many options available for cleaning spinnerettes, including vacuum chambers, salt baths, TEG (triethylene glycol) systems, and fluid bed systems. But the most economical method may be heat cleaning in a burn-off oven.

Heat cleaning ovens thermally decompose the polymer in a low oxygen atmosphere to inhibit combustion. They then burn the resulting vapor in a direct-flame afterburner.

There have been some reports that spinnerettes can be damaged in ovens by exothermic reactions if the plastic burns on the parts and releases heat. Steelman Industries, a heat cleaning oven manufacturer, conducted a series of tests to determine if this truly created a problem.

**Testing Process:** Three spinnerettes and a pack body loaded with polypropylene were processed in an oven at a temperature of 900°F for three hours to ensure that all of the polymer and resulting carbon was removed. Thermocouples were located just above the spinnerettes, and one was placed inside the pack body to monitor and record part temperature during the process. A second test was conducted with recycled polyester.

**Results:** At the end of the tests, the spinnerettes were completely free of polymer and carbon, with only a light coating of ash and pigment remaining. This material can be easily removed by rinsing in water, or in an ultrasonic cleaner.

The chart produced during the process, clearly shows the spinnerettes remained slightly below oven temperature at all times during the test. This indicates that there were no exotherms present to damage the spinnerettes.

**Other Concerns:** There may be other concerns about using ovens to clean valuable pack room parts, so it will pay to choose your heat cleaning oven carefully. Most ovens are bottom-fired, and may cause parts to overheat if placed too close to the combustion chamber. Our test oven was heated in a top-down manner to eliminate this possibility.


Be sure that the oven you select has adequate afterburner temperature (1,500°F minimum) and residence time at temperature (typically 1/2 second) to completely destroy all vapor produced in the oven. Also, have the manufacturer provide actual stack test data, not calculations, to assure their ovens will have low emissions.

Ovens that process parts with a large quantity of polymer should have a dynamic control system, such as Rate-of-Change control to keep the vapor production at a safe level. These systems continuously monitor the

vapor production in the oven. Some other systems require the operator to select a program from a menu, or set a cycle time, which can cause errors.

If you are concerned about your parts being overheated, you should invest in a part temperature controller and chart recorder. This includes a long, flexible thermocouple in the oven to clamp to your parts. This system will spray water if your parts exceed setpoint to control the maximum part temperature.

**Conclusion:** If you are searching for a safe, economical method for cleaning your spinnerettes and other tooling, give serious consideration to heat cleaning. Heat cleaning ovens typically cost a fraction of other devices, are inexpensive to operate, and they are environmentally friendly.

For more information about the Steelman line of heat cleaning ovens, contact John Deere at Precision Equipment Sales Co., P.O. Box 662, Matthews, North Carolina 28106 USA. Telephone: 704-845-0990. Fax: 704-845-0999. 

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