



The **Extru-Technician**

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HOW TO KEEP YOUR EXTRUSION ZONE *SALMONELLA* FREE, PART II

Welcome to our next installment of the *Extru-Technician* series regarding sanitation and sterilization. Before detailing the extruder in this segment, it is important to understand the context of this article series.

story continues on page 4

Editor's Note: This article is Part II of a series based on Extru-Tech's scientific validation of killing *Salmonella* in a production scale extruder.

Photo: Dreamstime.com



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First, it must be noted that the content of this article is not intended to be a direct replacement, or to act as the sole justification for any modification to an existing or proven set of sanitation/cleaning procedures. However, these steps have been scientifically validated in their effectiveness to kill *Salmonella*.

It also is important to understand the differences among the terms clean, sanitary and sterile.

- **Clean** – Free of visible soil and grime
- **Sanitize** – A specific log reduction of targeted microflora is experienced
- **Sterilize** – 100 percent lethality of targeted microflora

The procedures discussed within this article produced a scientifically validated sterilization of an Extru-Tech extruder.

Starting the cleaning process

To begin the cleaning process, a barrel cleaning plate must be attached to the

shaft support or flare-out die adapter, while attached to the extruder. The barrel cleaning plate must be equipped with a valve and hoses/piping to direct all waste to the appropriate receptacle (solid or liquid waste, residual chemical wash, etc.). The shaft support is a critical component of the required parts for this procedure, as the extruder will be running for an extended period of time. If the support is not installed for this cleaning process, the screws and liners may experience undue wear and damage.

To remove exterior extruder residue, a low-pressure foam application is recommended. A foaming alkaline chlorinated detergent proved to be the most effective. Be sure to follow the same guidelines for cross-zone contamination and chemical de-activation as outlined in Part I of this series.

For the internal extruder components (shaft, screws, liners, etc.), a rinsing flush is first initiated. When the cleaning plate valve is closed, begin adding water to the barrel. This can be done via a water injection system or with a hose

Targeted cleaning

On the extruder, we identified six areas that will most likely require additional focus concerning a cleaning protocol. These include:

1. Base, frame, supports and shields
2. Under-carriage
3. Inlet head
4. Head clamps or head bolts
5. Shaft support rings
6. Flare-out die adapters

Again, each of these areas poses a possible issue in regards to typical locations of residue build-up and requires additional attention.

at the inlet. Warm water at a minimum temperature of 150 degrees F is used at the inlet.

If the steam injection system is used to heat cold water, be sure to allow for the barrel to fill with water to at least 25 percent before injecting the steam. Injecting pure steam onto the extruder rotating components could cause warping and lead to premature wear.

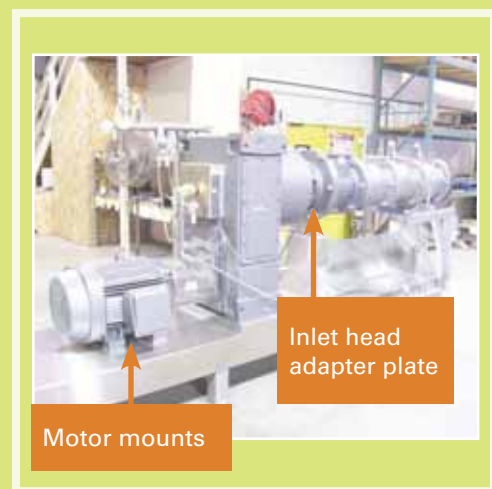
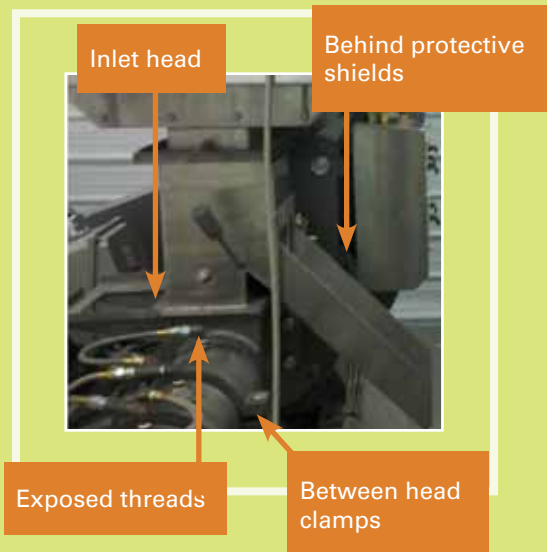
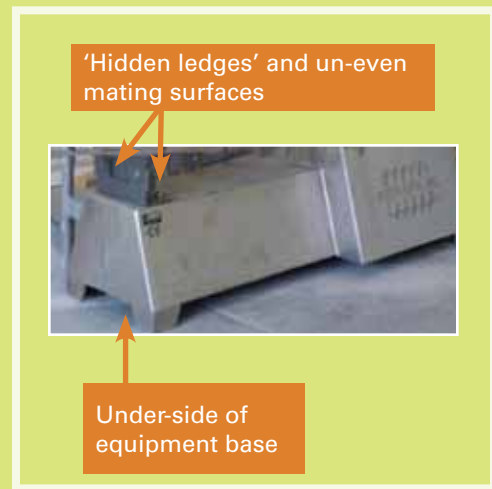
As the water fill level reaches 50 percent in the barrel start the extruder. The proper rotational speed will be determined by the configuration of the screw components. As the barrel fill level reaches close to full, begin cycling the cleaning plate valve open and closed to permit large debris to be discharged. Maintain this operation until a steady stream of water free of debris is discharged.

Chemical wash, heat treatment

Extruder exterior and interior foaming and chemical wash has similar constraints and procedures that are outlined in [Part I of this series](#).

The heat treatment of the extruder barrel is similar to that of the ADP preconditioner. First, confirm that the barrel shaft is rotating at the optimum speed based upon the extruder screw configuration. If you are not sure, a safe range to consider is between 50 and 150 RPM. When water levels in the barrel reach about 50 percent, begin injecting steam into the barrel. If so equipped, heat the head jackets to assist in obtaining a specific die temperature. In most cases, 190 degrees F is adequate.

It is



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important to pay attention to the die temperature and also to monitor the temperature at the extruder inlet with an additional probe. It also is critical that the two temperatures are similar (within 7 degrees F of each reading) to ensure the entire extruder barrel has reached the appropriate sanitation temperature.

Once the appropriate temperature is reached, block off the extruder inlet. This is important for two reasons.

1. Prohibits the splashing of wash medium out of the extruder barrel
2. Prohibits splashing/dripping of wash medium from other zones into the extruder barrel.

As long as these precautions are taken, completing a barrel clean-in-place (CIP) simultaneously with an external sanitation standard operating procedure (SSOP) becomes practical and beneficial in terms

of labor and downtime costs.

As the system dwells in this heat treatment, be sure to monitor the temperatures constantly to ensure the target temperature is maintained for the entire CIP duration. Any type of automated system would undoubtedly benefit the integrity of this process.

It was determined during Extru-Tech's sanitation and sterilization trials that extruder shaft speed has an extreme impact on the effectiveness of heat treatment in terms of minimizing dwell time and efficiently assigning the targeted dwell temperature. An over-the-counter, scented dishwashing soap added to the extruder before the heat treatment cycle will help reduce staining and odor.

The next article in this series will follow soon with other tips on how to maintain pathogen free zones in your extrusion process.

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Your drying and extrusion resource

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