

The **Extru-Technician**

November 2014

Extru-Techinc.com

**PRODUCT COATING,
CONSIDERING THE RIGHT
SOLUTION TO MEET YOUR
MANUFACTURING DEMANDS**



WELCOME LETTER

PRODUCT COATING, CONSIDERING THE RIGHT SOLUTION TO MEET YOUR MANUFACTURING DEMANDS

Welcome, and thanks for your continued interest in *The Extru-Technician*.

In this issue of *The Extru-Technician*, we discuss why coating is a critical step in the pet food process. This article compares the three most common methods of coating with an added focus on continuous batch coating technology.

As always, we hope you find this issue of *The Extru-Technician* informative as we share with you some of our expertise on the coating process and critical items to consider in your pet food facility. Please continue to share your comments and thoughts with us; we appreciate the feedback and look forward to offering solutions.

Sincerely,
R. Scott Krebs
Executive V.P., C.O.O.
Extru-Tech, Inc.

Check these out!

Stay on top on the hottest topics in extrusion

Subscribe today and never miss out on an issue of *The Extru-Technician*.

Make sure you don't miss Extru-Tech's ground-breaking series, "Keeping your extrusion zone *Salmonella* free." Check out the archived issues today!

Subscribe Now



PRODUCT COATING, CONSIDERING THE RIGHT SOLUTION TO MEET YOUR MANUFACTURING DEMANDS

How flexible is your coating system based on the product mix? Does your system meet the standards of your food safety program? Are the correct construction materials being used for your coating system (i.e. liquid digest inclusion and clean-in-place (CIP) options require stainless steel construction)? These are all considerations that we address in this issue of *The Extru-Technician*.

Coating system process, considerations

One of the primary reasons for coating pet food is to ensure the intended species finds it palatable. Product coating also provides a means to deliver additional nutritional ingredients, anti-microbial and oxidation barriers to the extruded pet food kibble.

Coating is usually one of the final processes before packaging that extruded pet food is subjected to with the exception of final product cooling.

The pet food industry uses a variety of externally applied liquids and powders to coat kibble. While some of these liquids and powders can be relatively low cost when compared with other ingredients within a pet food formula, some coating ingredients carry the highest cost among all components when manufacturing pet food. Therefore, accuracy is imperative to meet label claims without over-formulating, and waste must be reduced to a minimum to maintain optimum margins.

Verifying you have the appropriate methods to control/monitor uniform application rates to meet product ingredient/label commitments is critical to the coating process. Most dry-expanded pet food operations apply liquid fat and/or flavors after drying to enhance the acceptability, fat levels and palatability of their products.

These products often are coated after drying but before cooling as the

The **Extru-Technician** brought to you by **Extru-Tech Inc.**



CORPORATE OFFICE

PO Box 8, 100 Airport Road, Sabetha, KS 66534
+1.785.284.2153 Tel +1.785.284.3143 Fax
extru-technician@extru-technician.com
www.extru-technician.com

ADMINISTRATIVE STAFF

LaVon Wenger President/CEO
Don Wenger Executive Vice President
R. Scott Krebs Executive VP/COO

EQUIPMENT SALES STAFF

Bill Huseby
Director of North America Sales
billh@extru-technician.com +1.913.522.9014
Bob Annan Director of European Sales
boba@extru-technician.com +1.785.284.2153
Osvaldo Munoz
Director of Latin America Sales
osvaldom@extru-technician.com
+56.2.955.25.74 Santiago-Chile

EXTRU-TECH, INC. PART SALES STAFF

Darryl Becker
darrylb@extru-technician.com
+1.785.284.2153

Enzhi Michael Cheng, PhD,
Director of Asia Sales
michaelc@extru-technician.com
+1.785.285.0703

Doug Coverdale
Sales Engineer
doug@extru-technician.com
+1.785.284.2153

Mike Dunlap
miked@extru-technician.com
+1.785.284.2153

MARKETING & EDITORIAL STAFF

Norm Schmitt Corporate Sales Manager
norms@extru-technician.com +1.785.284.2153
Will Henry Technical Sales Engineer
willh@extru-technician.com +1.785.284.2153
Rachel Ulreich Marketing Specialist
rulreich@extru-technician.com +1.785.285.8064

A WATT Global Media/Petfood Industry
custom publication

PRODUCT COATING, CONSIDERING THE RIGHT SOLUTION TO MEET YOUR MANUFACTURING DEMANDS

appropriate method for the liquids and dry powders must be applied. Temperature optimization (heating and cooling) for base, coating and liquid delivery lines including the coating system residence time for appropriate absorption of liquids into the pellets is critical. One advantage of coating before the cooling process allows you to coat a warm product, which improves the absorption capability of the pet food kibble.

Coater mixing systems

Drum Coater (Continuous spray into a rotating drum). This product offers large throughputs up to 33,000 lbs. per hour and is gentle on the product, see Figure 1. The drum coater design offers a lower cost and has an adjustable retention time. Liquid fats and flavors are normally applied in

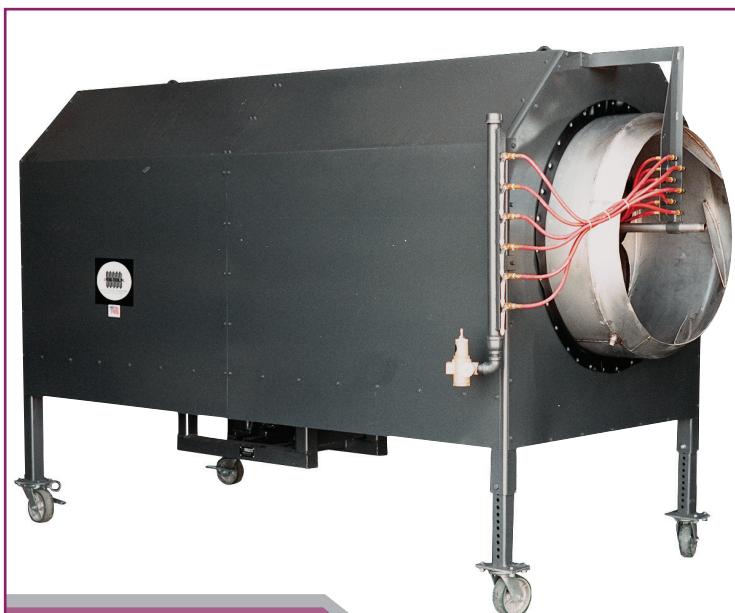


Figure 1. The drum coater design offers a lower cost and has an adjustable retention time

revolving cylindrical reels by spraying a mist of liquid or sprinkling a dry powder over the product as it enters the rotating drum such as through the use of the Extru-Tech Rotary Applicator System.

It has a maximum coating of fats typically up to 8 percent and a limited nozzle configuration and typical designs allow up to two liquids and one powder at one time. Because of the open design, greater care and planning is needed as to where this unit is installed and operates from to reduce the potentials of cross-contamination.

Rotary Disk Applicator (Continuous spray into plenum using rotating disk).

This method creates a curtain of liquid coating without the use of spray nozzles and can achieve up to 30,000 lbs. per hour, see Figure 2. However, it also requires additional mixing components such as screw feeders, loss-in-weight feeders or weight belt feeders to apply dry additives to your coating process. While the disc applicator may be easy to access for housekeeping purposes, a mechanical trough-type feeder typically used after the applicator requires more maintenance and cleaning which equals more downtime. The feeder is used to achieve higher retention times and for powder addition.

This method is less accurate and precise than the batch coating option and increases the risk of product breakage. Rotary disc applicators allow one liquid or slurry to be



Figure 2. This method is less accurate and precise than the batch coating option and increases the risk of product breakage.

added at a time and additional liquids could be added; however, the liquids must be compatible or the system requires an additional rotary disc applicator. Additionally, the cost is greater than the rotating drum design. Generally, the application rates for the rotary disc applicator are in the range of 0.5 percent up to 3 percent.

Advanced feature batch coater

What defines best-in-class finished product coating? Precise accuracy of liquid and powder coating applications, processing flexibility and food safety, see Figure 3.

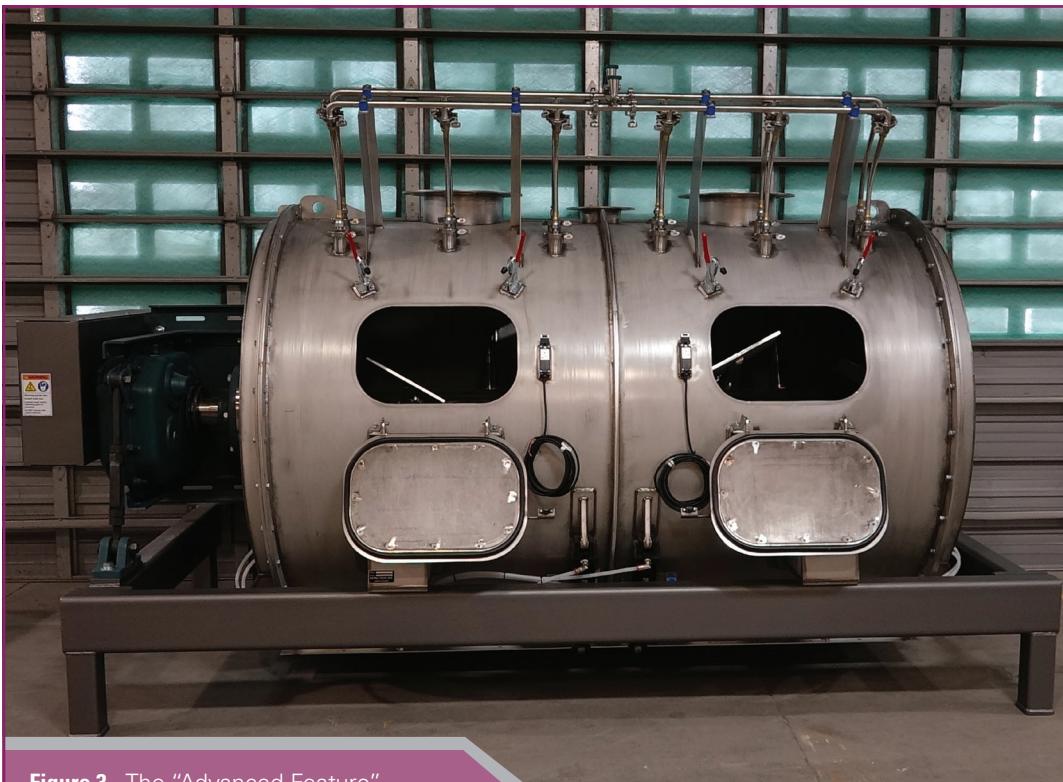


Figure 3. The “Advanced Feature” Batch Coater provides ultimate batch consistency with exceptional food safety attributes.

PRODUCT COATING, CONSIDERING THE RIGHT SOLUTION TO MEET YOUR MANUFACTURING DEMANDS

Extru-Tech's new Advanced Feature Batch Coater achieves all of these, through:

- Totally enclosed sanitary design that meets new pet food safety regulations
- Optimal integration with existing ETI Vertical Cooler
 - Reduces the need for product conveyance between coating and cooling
 - Reduces capital expenditures
 - Lowers recurring maintenance costs
 - Reduces possible product breakage
 - Reduces / Prevents condensation within the coater
- Liquid application uniformity across the entire batch
- Exclusive fogging application for evenly applied powders
- Extremely accurate dosing for less waste of expensive coating materials and reduced label claim risks
- Multiple spray nozzle options provide optimal product coverage and absorption
- Quick, standard cleaning procedures
 - Optional CIP
 - Enhanced with the reduction of horizontal ledges

- Batch coating capacities up to 40,000 lbs. per hour
- Application range from 0.5 percent to 12 percent (percentage of kibble rate)
- Generates less than 0.25 percent fines

The Advanced Feature Batch Coater provides ultimate batch consistency with exceptional food safety attributes.

The importance of coating accuracy

A recent case study of the Extru-Tech batch coater found that extreme accuracy and precision is inherent in the static scaling design of the kibble and coatings (versus continuous flow measurements, weigh belts and volumetric metering). In addition, the dual option of high/low and low-flow liquid manifolds and the ability for variable speed and variable direction allow for optimal uniformity in coating across the batch — and from batch to batch. This allows for lower formulated overages to deliver the guaranteed nutritional analysis, improved consistency in feeding experience and, most importantly, palatability.

The combination of the scaling accuracy and application precision presents a significant level of financial payback on the batch coating system, see Figure 4. Assuming a single extruder process system at an annualized throughput of 60,000 tons and application of poultry fat (cost assumption \$0.50 per pound) and

Figure 4. A comparison of three pet kibble coating systems

System design/ capabilities	Coating systems review		
	Rotary drum coater	Rotary disc mist coater	Batch coater
Type	Continuous	Continuous	Continuous batch process
Mode of weigh			
Dry feed	Weigh belt or impact plate	Weigh belt or impact plate	2 scale hoppers on load cells GIW
Liquids	Pumps/check valves/ recirculation/flow	Flow meters	1 vessel per liquid on load cells GIW
Powders	LIW feeder	LIW feeder	1 feeder per powder on load cells GIW
Accuracy of coating application	1.00%	1.00%	0.25%
Retention time control	Feed rate/volume of coater and pitch unit	Feed rate and volume of coater	Feed rate, product density and operator selected mixing time
Space requirements	Smaller vertical footprint	Larger vertical footprint	Larger vertical footprint
	Larger horizontal footprint	Larger horizontal footprint	Smaller horizontal footprint
System operation			
Spray nozzle options	Restricted due to throughput	Spinning disc, no nozzles	Multiple to manage retention, great product coverage and absorption
Clean-out	Limited access	Easy access	Access and gravity sanitation
Versatility and flexibility	Limited variable-speed, smaller range of recipe	Optional variable time, multiple nozzle, medium range of recipe	Variable-speed, variable direction, variable time, multiple nozzle
Dry palatant application	Single point or fanned	Single or dual point	Atomized
System sanitation			
Equipment design	Open inlets	Totally enclosed	Totally enclosed
Environment	Higher potential for contamination	Higher potential for contamination	Protected
Internal	More components - harder to clean/sanitize	More components - harder to clean/sanitize, higher	Fewer components - easier to clean/sanitize
Finished product characteristics			
Uniform coating	Poor to average	Average to good	Excellent
Material handling	More aggressive	More aggressive	Very gentle
Product degradation (% fines)	0.50% - 1.00%	0.50% - 1.00%	0.0% - 0.25%

PRODUCT COATING, CONSIDERING THE RIGHT SOLUTION TO MEET YOUR MANUFACTURING DEMANDS

liquid flavor enhancer (cost assumption \$0.40 per pound) and reduction in coating formulation of 0.8 percent (which in our opinion is a conservative analysis) the annualized savings would be \$850,000.

Food safety for coating systems

What are the risks and how do you control the risks? Contaminated product components, condensation, cross contamination and non-sanitary equipment design are all food safety risk factors in coating systems. We have evaluated each of these categories and have pinpointed areas that are often overlooked.

Areas for possible product contamination consist of dried base kibble, liquid coatings and dry palatants. The traditional coating environment is perfect for condensation and may result in exponential microbial growth.

All ingredients going into your process are considered a risk when it comes to food safety. The CCP (critical control point) must define the last point in the process to control the risk. Extru-Tech has a validated CCP at the extrusion zone of the process. Because this is before the coating process, it is strongly recommended to have procedures in place that check for recontamination after the extrusion process. This is achieved by implementing sanitary designed equipment, sampling each ingredient going into the coater and lot tracking of all liquids and powders. Lastly, once

the coated product leaves the coater, it is recommended to test and hold procedure.

When talking about condensation, our experience shows that base kibble temperature needs to remain between 122-140 degrees F and the coating materials temperature should be between 86-122 degrees F. We also recommend an air temperature within 59 degrees F of the product temperature.

Cross contamination causes, solutions

Cross contamination is one of the most common problems in pet food processing facilities. This can arise from a variety of sources, including air, material buildup, sampling by operators, residual product from tanks and storage vessels as well as trailers. Other causes of cross contamination can be delayed return of dust to the production line and various dust emissions, including residual product inside conveying equipment, bin and hoppers.

Product sampling has also been a proven area for cross contamination. Oftentimes, an operator's hands, product scoops and leakage in the coater room create unsanitary conditions and potential for risk. By using an automated sampling process, you can greatly reduce the potential for cross contamination and leakage from sampling areas while increasing sampling frequency on the coater.

9

Nine questions to help determine which system is right for your process

1. How much flexibility is needed?
2. Range of liquid application percentage?
3. Is the target product fragile or resilient?
4. Is product degradation and fines generation important to the final product?
5. Are the coating materials expensive or nutritionally required?
6. Are accuracy and precision important?
7. Is optimum coating uniformity important?
8. Are there stringent sanitation requirements?
9. Is my installation height constrained?

Food safety, equipment design

Food safety regulations have greatly impacted sanitary equipment design requirements. Although these regulations do not require equipment manufacturers to redesign their equipment, many of the improvements are made to match the growing needs and versatility of our clients. Further, rough surfaces and welds, dead spaces, slide gates, bearing seals and transitions are all areas of equipment design that need to be considered when it comes to food-safe designs.

A sanitary designed coater should be totally enclosed to reduce cross contamination, product surfaces and welds are smooth and free of cracks and/or crevices. At Extru-Tech, we use butterfly valves versus standard

slide gates. Other sanitary design changes include strategically positioned inspection and cleaning access ports. The liquid tank frame is designed to manage lot control and use recirculation.

Room construction is an integral part of controlling food safety risks. Ideally, by using isolation walls between the pre-kill and post-kill zones allows segregation of each process, which also controls employee entry points. A well-thought-out design also will minimize the equipment floor plan.

To maintain consistency and control, we recommend using room air systems that consist of an automated air pressure control system, filtering the air through a HEPA air filter which is 99.97 percent efficient at 0.3 micron and using

PRODUCT COATING, CONSIDERING THE RIGHT SOLUTION TO MEET YOUR MANUFACTURING DEMANDS

ultraviolet treatment of the air coming into the room to remove bacteria before entry. Lastly, we recommend the use of sanitary drains to eliminate or reduce the buildup of bacteria and re-entry of the coater room.

With all of the various coater designs on the market you might be asking yourself,

“How do I choose the proper coating system?”

For more information about the various coating options or to find out which method is suitable for your process, contact our coating expert, Norm Schmitt at norms@extru-techinc.com.

The **Extru-Technician**

Your drying and extrusion resource

Have the next issue delivered directly to your inbox. Just click [here](#) to subscribe.

(Or visit http://eforms.kmpsgroup.com/wattpub/forms/extr_subscribe.htm)



Single Screw Extrusion 100% Fresh Meat Inclusion New Outlook Defines Premium Petfood

Available now online, our recently sponsored webinar reviews product developments around high meat inclusion/no grain recipes and related successes using the single screw extruder to make this product.



www.extrutechnician.com

In this webinar, Greg Aldrich and Will Henry will dispel the fears currently in the market to run high meat diets. Both will also present information about how those types of products will very soon define the Super-Premium Petfood category.

Audience Benefits will include:

- Discover new formulation synergies
- Leverage standard and existing production models
- Learn to maximize existing process architecture
- Secure the highest level of food safety utilizing systems already in place
- Enhance process efficiency
- Establish product protection validation



Webinar On-Demand Link

<https://www1.gotomeeting.com/register/249163065?linknumber=website>

EXTRU-TECH
INC.

CORPORATE OFFICE

P.O. Box 8 • 100 Airport Road • Sabetha, KS 66534, USA
Phone: 785-284-2153 • Fax: 785-284-3143
extru-techinc@extru-techinc.com
www.extru-techinc.com

Partnering for your Profitability

Introducing **1 Solution Group**, a group of hand selected industry experts and food processing specialists that provide consultation on process audits, technical construction management assistance, food safety implementation and development and introduction of new products.

Research has consistently shown that petfood companies want to improve existing manufacturing capabilities — whether it be optimizing capacity, improving quality or refining food safety. At **1 Solution Group** we bring experience in extrusion manufacturing operations, commercial pet food manufacturing, manufacturing staffing, project management, safety and food safety implementation.

To start the discussion about partnering on your production challenges, contact us directly at 785-285-8411.

1Solution
GROUP
Global Project Solutions Group
Feed/Food Processing

1 Solution Group
100 Airport Road
Sabetha, Kansas 66534

phone: 785-285-8411
fax: 785-284-3143
jherbster@1solutiongroup.com