



## OUTLINE OF PLANNED FOOD INDUSTRY COURSES IN THAILAND – NOVEMBER 2014

These short courses are presented by [FoodStream](#) in conjunction with the [Institute of Food Research and Product Development \(IFPRD\)](#), Kasetsart University, Bangkok, Thailand.

**NOTE: We appreciate early registrations: Each of the following courses will only proceed if sufficient registrations are received. We encourage registration by the “early registration discount” deadline of Friday 26 September 2014 (15% discount applies).**

### **Courses offered:**

Applied Food and Feed Extrusion – 10 to 12 November 2014 .....	2
Principles of Extruder Die Design – 13 & 14 November 2014 .....	4
Food Water Activity and Drying Technology – 13 & 14 November 2014 .....	5
Feed Manufacturing Technology – 17 & 18 November 2014 .....	6
Breakfast Cereals Manufacturing Technology – 19 November 2014.....	7
Optimisation of Retort Processes – Dates to be finalised .....	8

Further information available via <http://www.foodstream.com.au/trainingasia>.

Or contact:

At **FoodStream:** Gordon Young, Email [gyoung@foodstream.com.au](mailto:gyoung@foodstream.com.au)  
(Australia) Phone: +61 414 681200

At **IFPRD** Vrangkana Bhundhoombhoad, Email: [ifrvrb@ku.ac.th](mailto:ifrvrb@ku.ac.th),  
(Thailand) Phone: +66 2 9428629 ext 201

## ***Applied Food and Feed Extrusion – 10 to 12 November 2014***

**Presented by Dennis Forte and Gordon Young**

### **Overview:**

This course provides participants with an understanding of the theory of the extrusion process, combined with a “hands-on” practical approach to demonstrating how the principles are applied across different products and extruder types.

Each day includes an introductory session covering relevant extrusion theory, followed by a group session in which the product formulation, and screw configuration/process parameters are “designed”. Then we go to the pilot plant and run the formulation/profile.

While a limited number of specific products can be made during the program, the range is selected to demonstrate the principles/issues involved across the range of types of extruded products – including expanded snacks and breakfast cereals, pastas and third generation snack pellets, pet foods and aqua-feeds.

Further information available via <http://www.foodstream.com.au> – click on “EVENTS” and link to the course web page.

**Topics covered** (May be subject to minor change)

### **Day 1**

***am***

*Review of Extrusion Theory*

- Principles of Extruder Configuration
- Role of Ingredients and preconditioner
- Role of Rheology in Extrusion Processing and the Screw and Die Characteristic
- Principles of Die Design – an overview

### ***Product 1 – Textured vegetable protein/pet food extrusion***

*Review/design - Raw materials and formulations*

- Screw profile
- Auxiliary devices
- Operating conditions

⊙ ***Visit pilot plant – observe TVP production in normal operation*** (single screw extruder)

**pm**

**Product 2 - Third Generation Snack Pellet**

*Review/design* - Raw materials and formulations

- Screw profile
- Auxiliary devices
- Operating conditions

⊙ **Extruder Trial Product 2**

Set up screw profile and produce third generation snack pellet using a twin screw extruder

**Day 2**

**am**

*Extrusion Theory*

- Causes and Effects of Extruder Instabilities
- Coextrusion

**Product 3 - Co-extruded snack**

*Review/design* - Raw materials and formulations

- Screw profile
- Auxiliary devices
- Operating conditions

⊙ **Extruder Trial Product 3**

Set up screw profile and produce a direct expanded snack with filling using a collet extruder

**pm**

**Product 4 – Direct expanded breakfast cereal**

*Review/design* - Raw materials and formulations

- Screw profile
- Auxiliary devices
- Operating conditions

⊙ **Extruder Trial Product 4**

Set up screw profile and produce a direct expanded breakfast cereal using a twin-screw extruder

**Day 3**

**am**

**Product 5 - High moisture meat analog**

*Review/design* - Raw materials and formulations

- Screw profile
- Auxiliary devices
- Operating conditions

⊙ **Extruder Trial Product 5**

Set up screw profile and produce a high moisture meat analog using a twin screw extruder

**pm**

- Extrusion process trouble shooting
- Quality assurance and How to Achieve it

# ***Principles of Extruder Die Design – 13 & 14 November 2014***

**Presented by Dennis Forte**

## **Overview:**

This course covers the theory and practice of designing dies for extrusion systems. The program is relevant to the production of all types of extruded products - including expanded snacks and breakfast cereals, pastas and third generation snack pellets, pet foods and aquafeeds.

The two-day program gives time for participants to carry out die design tutorials.

Note that familiarity with extrusion technology is assumed. We recommend that participants complete one of our three day 'Food & Feed Extrusion' programs or similar training, before attending this course.

Further information available via <http://www.foodstream.com.au> – click on “EVENTS” and link to the course web page.

**Topics covered** (May be subject to minor change)

## **Day 1**

Understanding Viscoelasticity

Flow Dynamics within the Extruder Die

Basic Principles of Die Design

Derivation of the Die Conductance Equation

Classification of Dies

*Tutorials # 1 and # 2*

The Entrance Correction

*Tutorial # 3*

## **Day 2**

Extrusion Die Capacity Models

Dies with Non-Uniform Geometry

*Tutorial # 4*

Design of Primary Dies

*Tutorial # 5*

Die Plate Wear and Its Influence on Product Quality

*Tutorial # 6*

Die Design Procedure

Use of Dimensional Analysis in Die Design

Obtaining Rheological Data from Extruders

## ***Food Water Activity and Drying Technology – 13 & 14 November 2014***

**Presented by Gordon Young**

### **Overview:**

This course provides practical knowledge of water activity in foods and food drying processes, relevant to drying a wide range of food products (extruded and non-extruded). Participants may attend either individual day, or the whole course.

**Day 1** focuses on *Water Activity in Foods*, what it is, its prediction and measurement, and its relationship to food microbiological and chemical stability.

**Day 2** concentrates on *Food Drying Technology*, general drying theory, and drying systems used in the food and feed industries.

Further information available via <http://www.foodstream.com.au> – click on “EVENTS” and link to the course web page.

**Topics covered** (May be subject to minor change)

### **Day 1**

#### ***Water Activity in Foods***

Water activity: Basic concepts & sorption/desorption isotherms

Water activity and microbial stability

Water activity and chemical stability

Sorption-desorption isotherms and prediction models (measurements, properties, uses)

Water Activity and shelf life (moisture migration through packaging materials)

Methods of measuring water activity/moisture content

Demonstration: practical use of water activity information (water analyser software)

### **Day 2**

#### ***Food Drying Technology***

Basic drying theory

Drying systems used in the food industry

Principles of psychrometrics, Tracing a drying process on a psychrometric chart

Principles of mass and energy balances as applied to drying processes

Monitoring/evaluating drying processes - belt and rotary drying examples

Design and specification of drying systems

Improving efficiency of established drying processes

Freeze drying (optional)

# **Feed Manufacturing Technology - 17 & 18 November 2014**

**Presented by Dennis Forte**

## **Overview:**

This course relates to the production of stock and aqua feeds, and covers pellet milling technology, basic extrusion processing, and related pre- and post-processing operations. It covers ingredients used and their characteristics, and the cooking/preconditioning of the mix. Issues with preparation of the mix (milling, mixing, etc.) are described, and how the ingredients, their preparation, and process factors, affect feed quality. Die and roller design, as well as post-process issues (i.e. product cooling) are discussed, along with new developments in the technology.

Further information available via <http://www.foodstream.com.au> – click on “EVENTS” and link to the course web page.

**Topics covered** (May be subject to minor change)

## **Day 1**

Overview of feed processing

Role of Ingredients in Feed Milling

- *Types of Ingredients*
- *Binding Characteristics*

Cooking and Preconditioning

- *The “Cooking” Process (Time, Temperature and Pressure)*
- *Starch Gelatinization and Protein Denaturation*
- *Alternative Preconditioning Equipment Designs*

Batch Mixing and Size Reduction

- *Defining the Mixing Process*
- *Particle Segregation*
- *Grinding Equipment*

Introduction to Pellet Milling Technology

- *History*
- *Applications*
- *General Background*
- *Process Description*
- *Mill Types*

Extrusion Processing Technology

- *Extrusion vs pellet milling – applications*
- *Extruder configurations*
- *Screw and die characteristics, extruder operating curve*

Die and Roller Design

- *Die geometry*
- *Design Criteria*
- *Impact of Wear*

## ***Breakfast Cereals Manufacturing Technology – 19 November 2014***

**Presented by Dennis Forte**

### **Overview:**

This program covers the range of operations involved in the manufacture of breakfast cereals, including core technologies such as flaking, puffing, and extrusion, and pre- and post- processing operations such as cooking/preconditioning, drying/toasting, and coating.

Further information available via <http://www.foodstream.com.au> – click on “EVENTS” and link to the course web page.

**Topics covered** (May be subject to minor change)

### **am**

Introduction and Process Overview

Raw Materials Selection

Cooking and Preconditioning

Food Rheology

Extrusion Processing Technology

Product Tempering

### **pm**

Flaking and Shredding Technology

Drying and Toasting Technology

Product Coating Technology

Product Cooling Technology

Whole Grain Puffing Technology

## ***Optimisation of Retort Processes – Details to be finalised***

### **Overview:**

Retorting (canning) has a long and safe history in the food industry worldwide. Developments in recent decades – suitable polymer materials for pouches/tubs, overpressure retorts, improved control systems etc - have allowed many improvements in the range and quality of products offered.

But a “new generation” of improvements are now coming on-stream, harnessing an improved knowledge of quality characteristics and control of quality changes, mathematical and computer-based techniques, and continuing developments in retorting technology.

This program provides information on new approaches and technologies related to retort processing, and the opportunities these techniques offer for improvement of current products and processes, and for the development of new products.

### **Tentative topics covered** (May be subject to change)

#### **Day 1**

The basics: Current retort technology in common use

- Basic retorting/canning technology
- Overview of thermal process design and calculation

Modelling/prediction of quality changes during thermal processing (texture, colour, nutrition etc)

- D & z values for quality
- Other models

Cooking value (quality) vs Sterilising/Pasteurising value

- The traditional approach to optimising quality in thermal processing

Advances in optimising “traditional” retort processes for quality

- Finite element models and advantages of this approach
- Programs such as NumeriCAL/CTemp

#### **Day 2**

Identifying the most important process parameters through a statistical approach

- the Taguchi Method.

Novel approaches to retort process design

- Graduated heating
- Novel approaches to agitation
- Real-time process control
- Combinations with other technologies.

Optimising retort processes for production and energy efficiency.