PETFOOD FORUM ASIA

Reducing Waste in Extruded Treats Production

29 October, 2025
Bangkok, Thailand

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BANGKOK, THAILAND

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Paul Mortlock– Profile

Since 2010, Paul Mortlock has served as Managing Director and CEO of Frazer-Nash Manufacturing, leading the company's transformation into a global innovator in end-of-extruder technology.

Under his leadership, Frazer-Nash has developed cutting-edge solutions for the safe production of pet food, becoming the preferred supplier for 7 of the world's top 10 pet food manufacturers.

Driven by a passion for precision engineering, Paul oversees the in-house design and manufacture of high-performance equipment built to exacting standards and engineered for a lifetime of use. His commitment to innovation and quality has established Frazer-Nash as a benchmark for reliability and technological excellence in the industry.

Paul holds three patents relating to pet food extrusion technology: Flow control in extruded pet treats, Extruder back pressure valve, Extruder mixing barrels

Steve Plas – Profile

Strategy Director for Frazer Nash Manufacturing since 2017. Primary responsibilities include, strategic customer development and innovation strategies.

Prior to his role at Frazer Nash, Steve worked for Hills Pet Nutrition / Colgate Palmolive for 35 years. During this time, he served as the Global Technical Processing / Engineering Director for Hill's.

During Steve's career at Hill's, he developed practical expertise for plant design, Supply Chain engineering for both canning and dry pet food manufacturing and in-depth knowledge of food safety principles and ingredient functionality.

Steve has three patents that involve: pet food dryer psychometrics, the production of low ash animal proteins and an extruder back pressure valve.

Frazer-Nash – Profile

Design and manufacturing company specializing in end of extruder barrel technology for the Petfood sector. Based in UK with an international customer base.

Sharing Best Practices

FRAZER-NASH MANUFACTURING

How to optimize your extruded treat process:

- Application of unique technologies to stabilize the extruder
- Reducing waste

Technologies shared today have applications in both Treats & Kibbles

Sharing Best Practices

FRAZER-NASH MANUFACTURING

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Market Trends & Reports | Nutrition | Safety & Quality | Production | Packaging | Sustainability | Protein 360

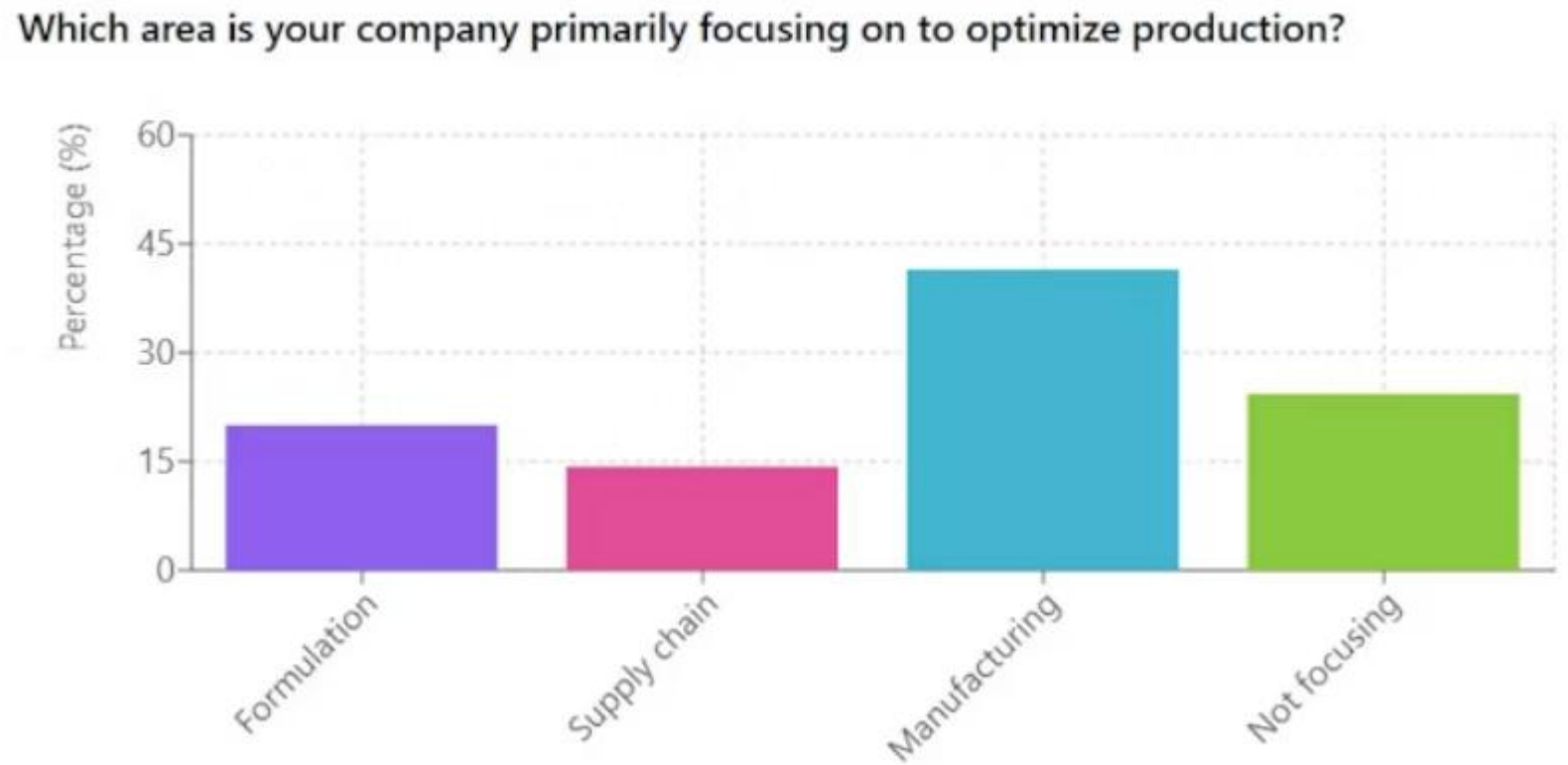
BUSINESS STRATEGY

Poll: Manufacturing efficiency tops pet food producers' optimization priorities

Nearly one-third of pet food industry professionals report their companies have reduced production costs in the past year, according to recent *Petfood Industry* polling data.

Lisa Cleaver
October 22, 2025

Sharing Best Practices



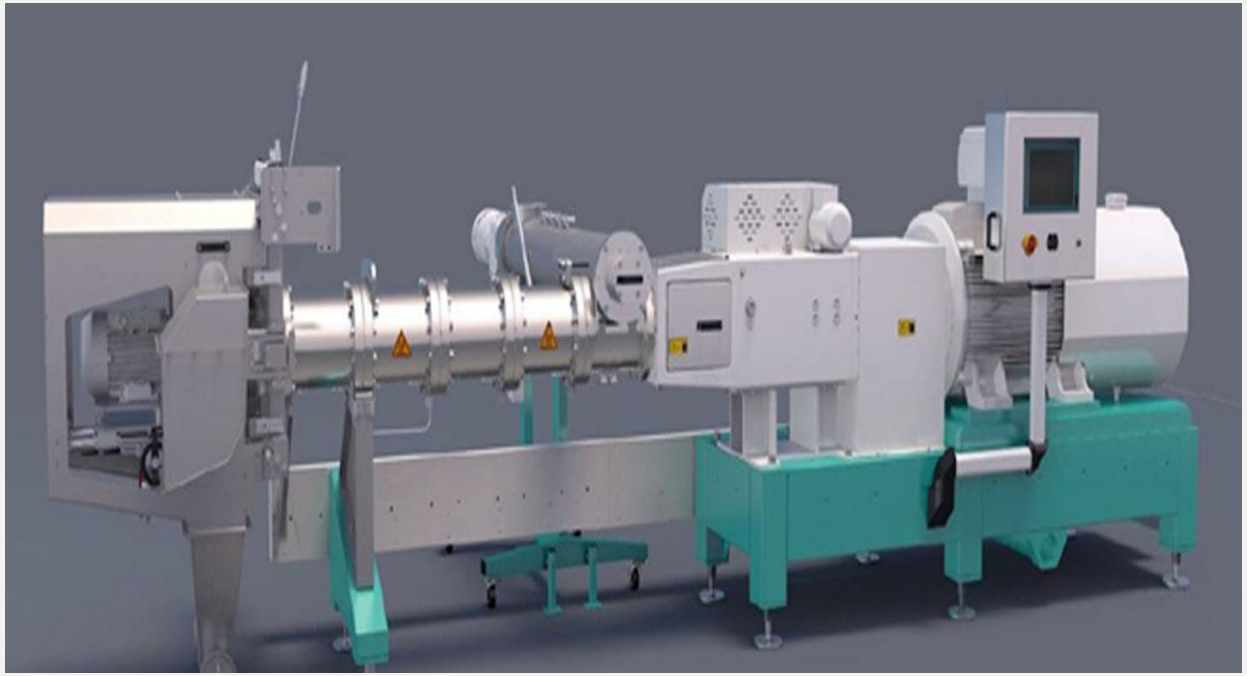
Types of Treats

FRAZER-NASH MANUFACTURING

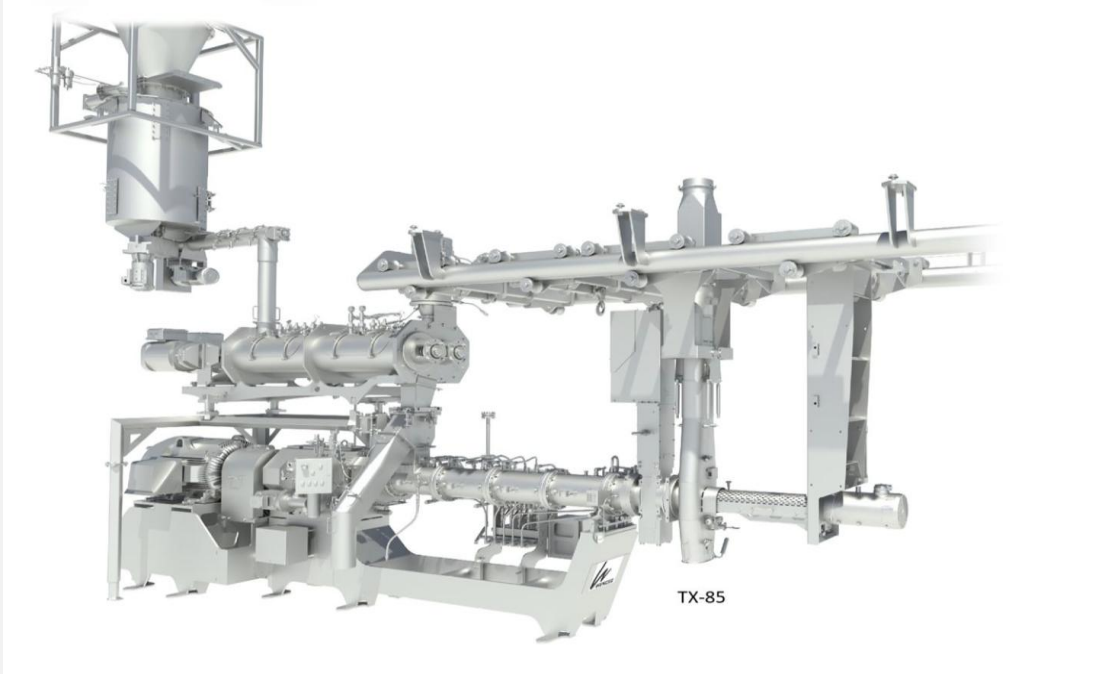
- Wide range of shapes and visual aesthetics
- Unique mechanical / die set-ups challenges

Typical Extruders for Treats

FRAZER-NASH MANUFACTURING



Buhler Compac Twin Screw Extruder

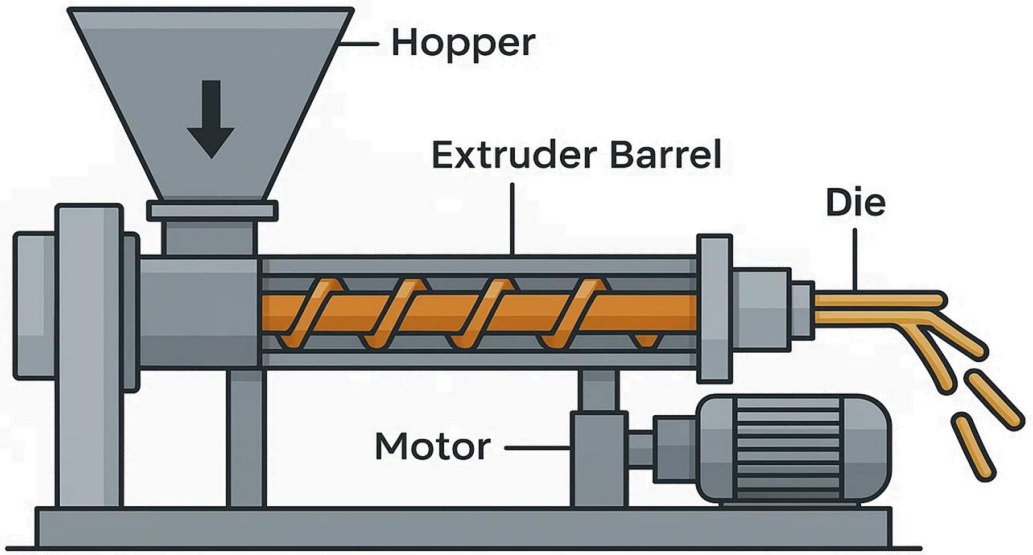


Wenger Magnum Series Twin Screw Extruder

Following the Process

FRAZER-NASH MANUFACTURING

PreConditioner



Barrel Sections

End of Barrel

Die Face

Treat Cutting

FRAZER-NASH MANUFACTURING

Yield - Preconditioner Waste Elimination

Source of Waste: A typical extruder start up results in a large amount of scrap / waste as grains are hydrated and the proper discharge temperature is achieved.

Solution: Achieve a faster start for increased throughput with minimal waste produced.

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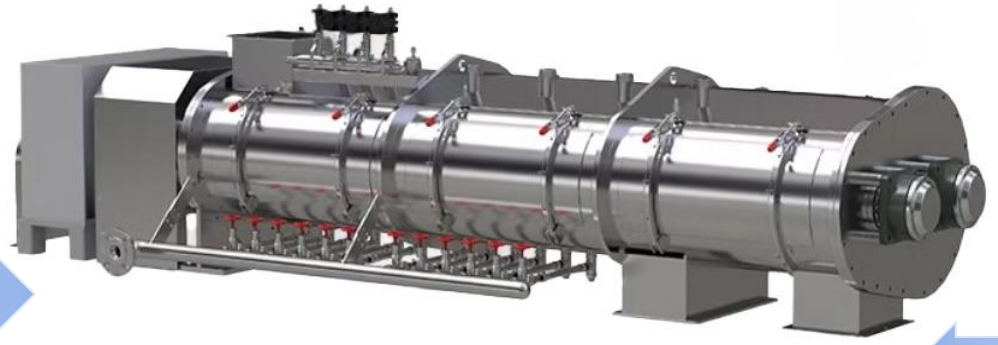
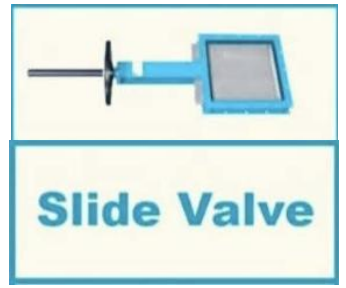
Best Practice - Preconditioner Waste Elimination

Operate the preconditioner in a “batch mode” at start up

- Load the preconditioner with a batch quantity of ingredients: valve is closed
- Preconditioner screws: one forward / one reversing
- Circulate until proper discharge temperature achieved
- Switch from a batching mode to continuous feed mode : valve is open / dry mix feeding

Load Cells





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Best Practice - Preconditioner Waste Elimination

Expected Results

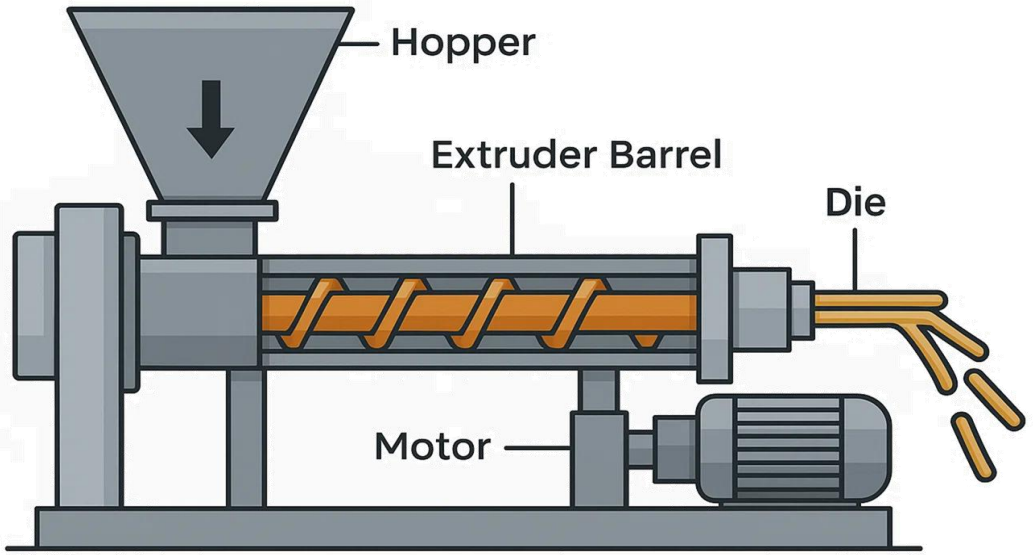
- **Start up waste can be reduced to approximately 50 – 75 Kg's**
- **Each yield point of improvement should be worth approx. $0.5 - 1M USD**

  (Typical for an extruder producing 45k Tons / Year)

Following the Process

FRAZER-NASH MANUFACTURING

PreConditioner



Barrel Sections

End of Barrel

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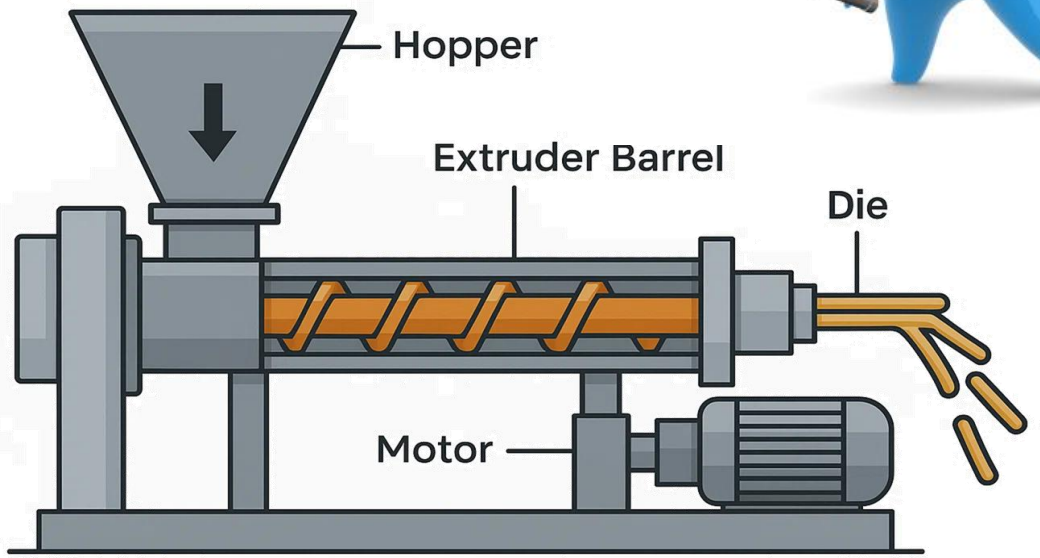
Following the Process

PreConditioner



Barrel Sections | End of Barrel | Die Face | Treat Cutting

Two Colour Treats

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Two colour treats are traditionally manufactured using two extruders.
Simultaneous production increases the risk of downtime and requires higher volumes

Source of Waste:

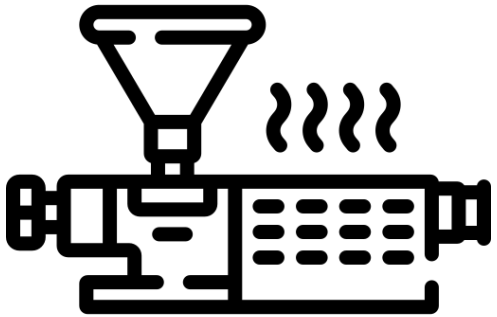
1. **Over capacity and line downtime**
2. **Over formulation of heat / shear sensitive ingredients**
3. **Excessive cap-ex to provide needed flexibility**

Solution:

1. **Flexible system using one twin screw extruder.**

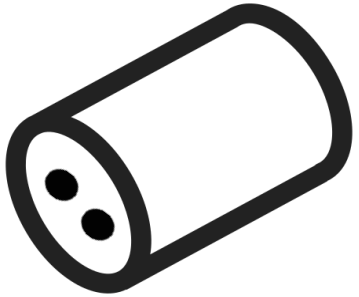
Bi-Colour Barrel

FRAZER-NASH MANUFACTURING



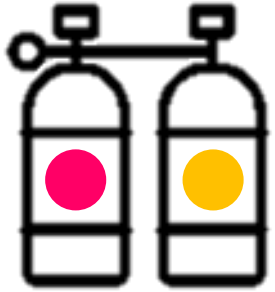
Twin Screw Extruder

B.C.B.



Two Equal but Different Colour / Shape Outputs

Colour Mixing System



or

Heat / Shear Sensitive Ingredient Injection

Bi-Colour Barrel

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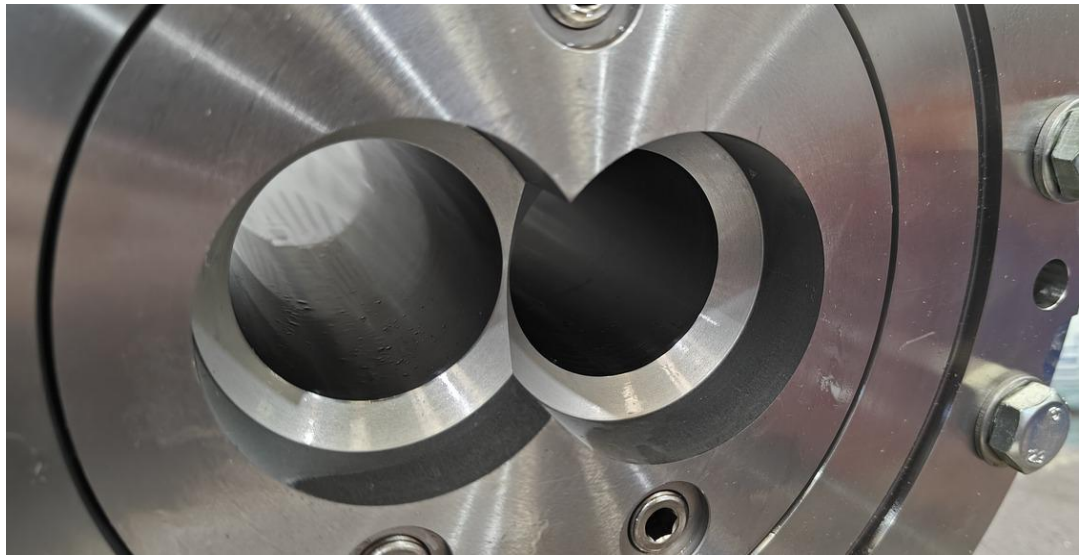
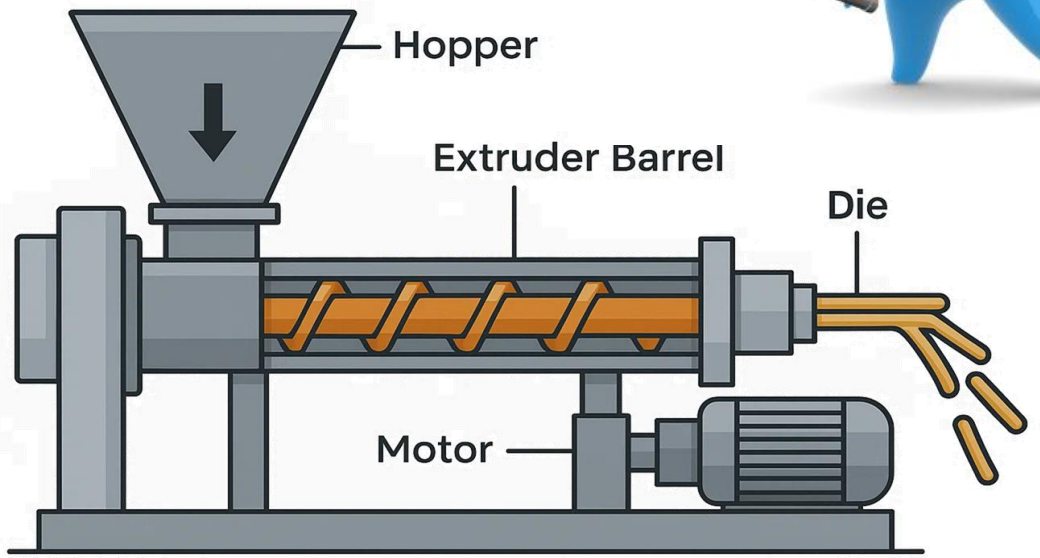
- Unique to twin screw extruders
- The extrudate flow is directed into two unique channels.
- This allows for:
  - Unique colours and shapes
  - Internal incorporation of heat / shear sensitive ingredients



Following the Process

PreConditioner

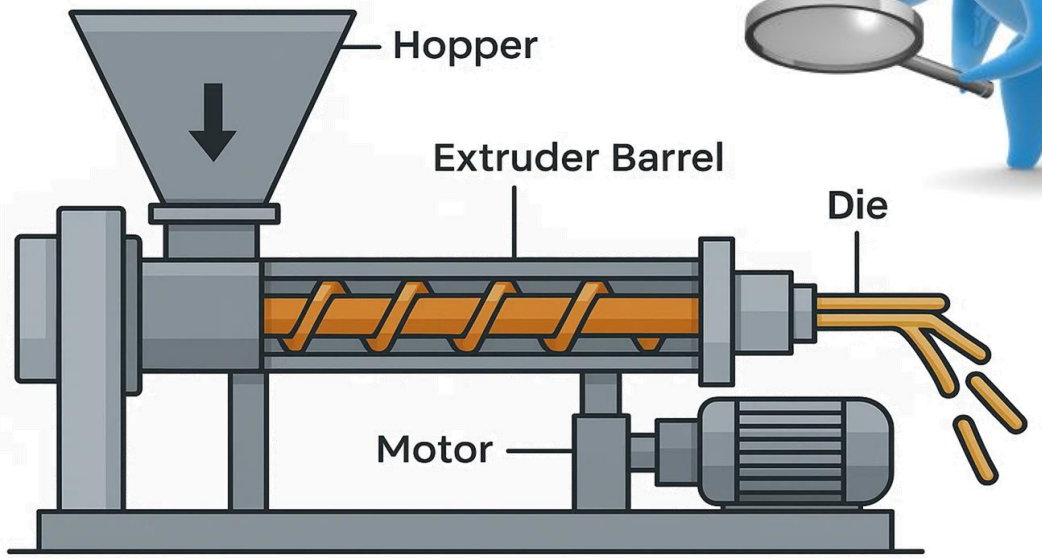


Barrel Sections | End of Barrel | Die Face | Treat Cutting

Following the Process

FRAZER-NASH MANUFACTURING

PreConditioner



Barrel Sections

End of Barrel

Die Face

Treat Cutting

FRAZER-NASH MANUFACTURING

Yield – End of Barrel Start-up Waste Elimination

Source of Waste:

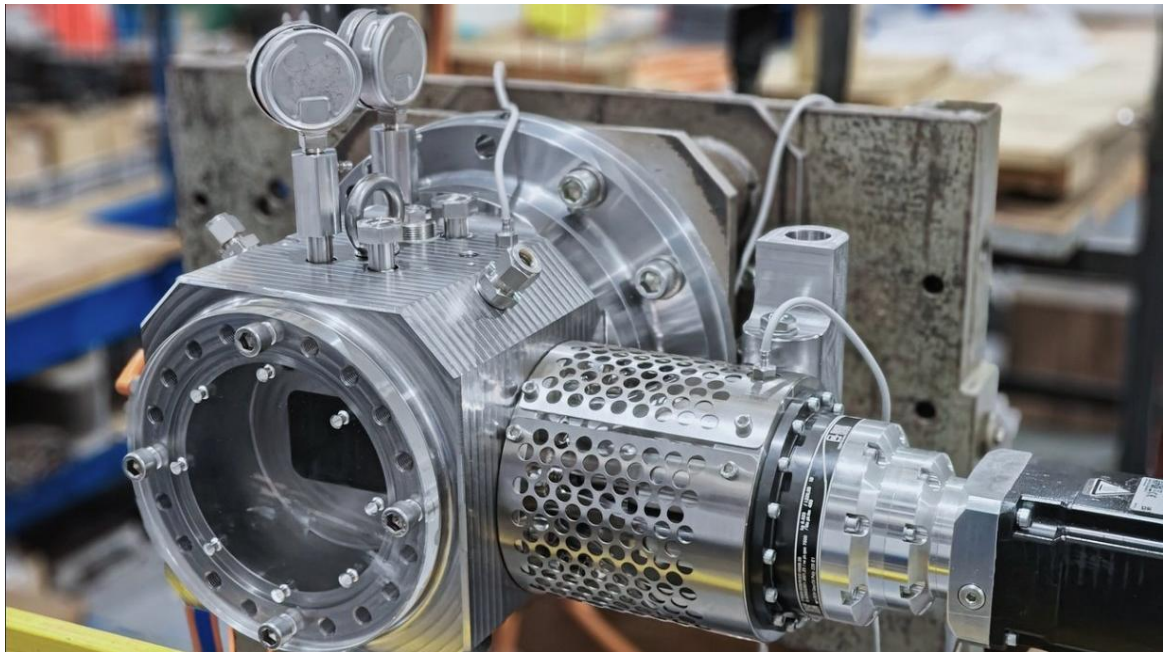
1. Out of specification product as system settles into "steady state"
2. Product is scrapped until a food safe sterile temperature is achieved

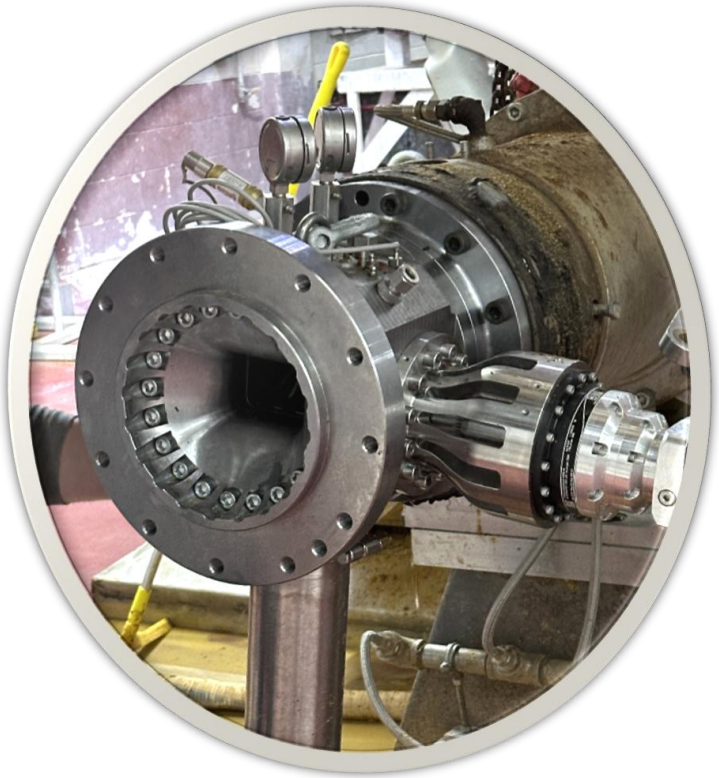
Solution:

1. Achieve a faster start up so minimal waste is produced
2. Application of a multi-functional sanitary extruder valve

FRAZER-NASH MANUFACTURING

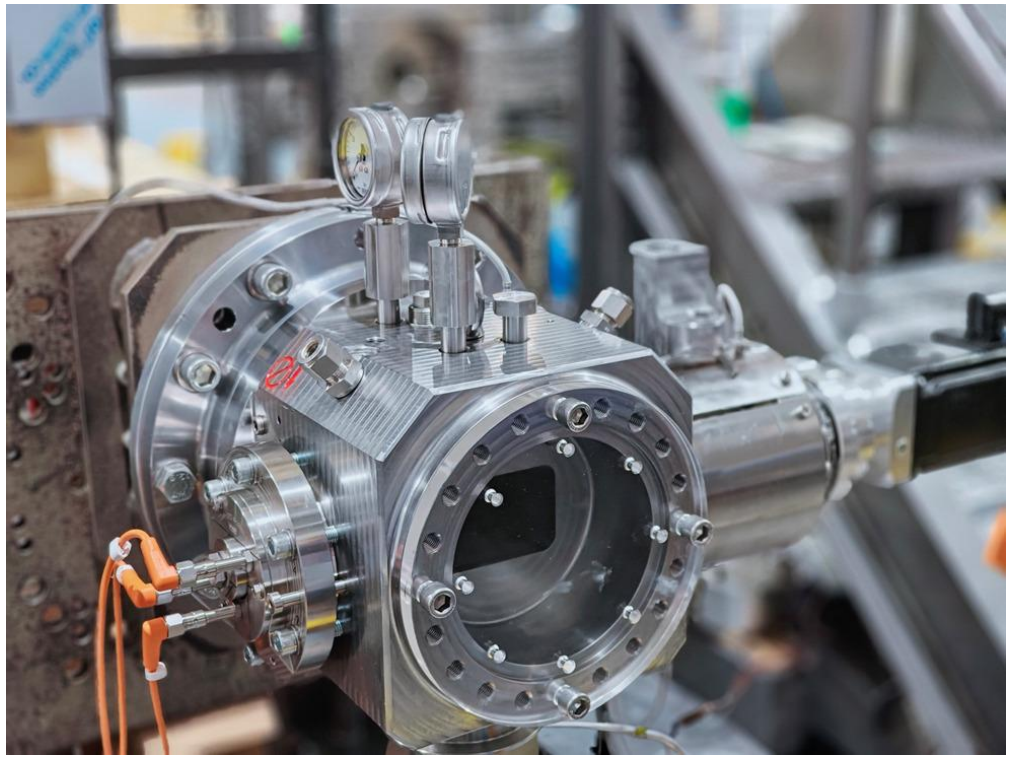
Best Practice: Application of a Sanitary Extruder Valve





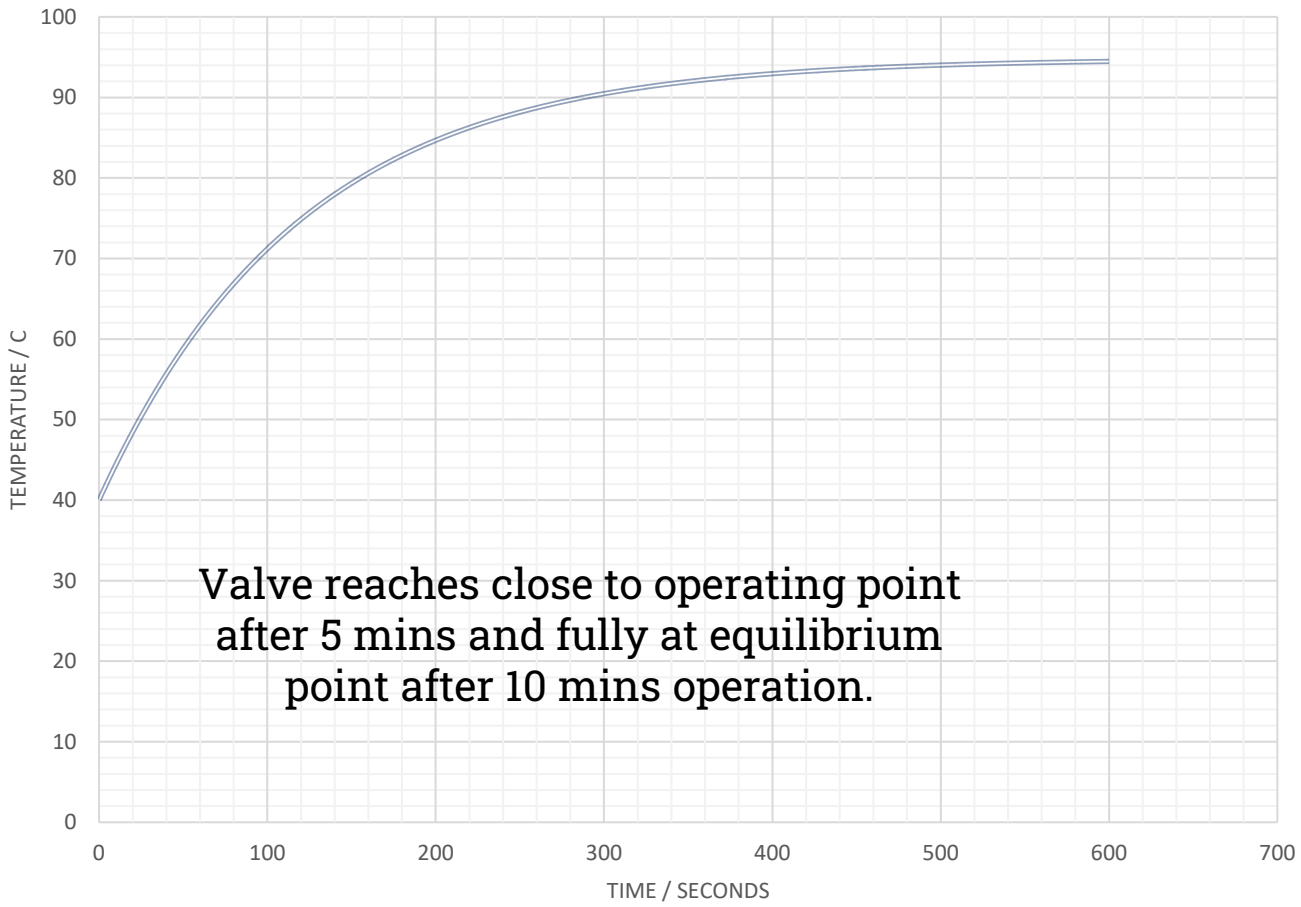
FRAZER-NASH MANUFACTURING

Best Practice: Application of a Sanitary Extruder Valve



- Operational safety: cannot fully block the extrudate flow
- Symmetry of flow to the die face / increased shear
- Proper metallurgy to minimize long term wear
- Cost of maintenance and ease of maintenance
- Delta temperature and pressure measurement capability
- Range of control especially when heavily restricted
- Thermal Management: heating / cooling elements / mass

Extruder Valve Warm-up Curve



Extrudate temperature 100C | Room Temperature 40C | 50kg stainless steel valve

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Best Practice: Application of a Sanitary Extruder Valve

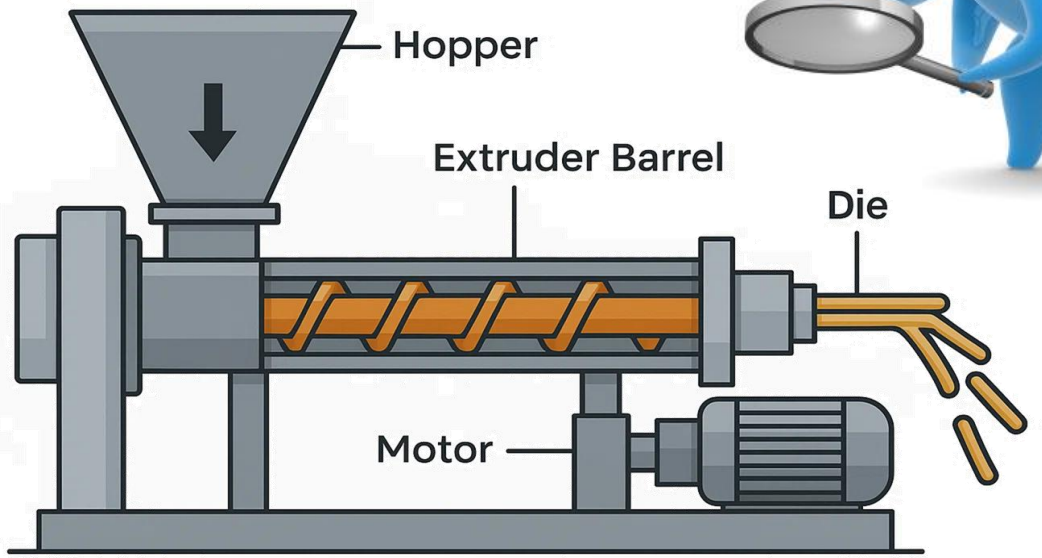
- **Functionality scale of use:**
  - \+ Divert at extruder start up and shut down
  - \+ Extruder control and process stabilization
  - ++ Temperature control point for end of barrel sterilization (Food Safety)
  - +++ Specific mechanical energy control for key product attributes
  - ++++ Control of differential pressure and temperature for wet density control

    AI modeling inputs
- **Applicable to twin screw and single screw extruders**

Following the Process

FRAZER-NASH MANUFACTURING

PreConditioner



Barrel Sections

End of Barrel

Die Face

Treat Cutting

Following the Process

FRAZER-NASH MANUFACTURING

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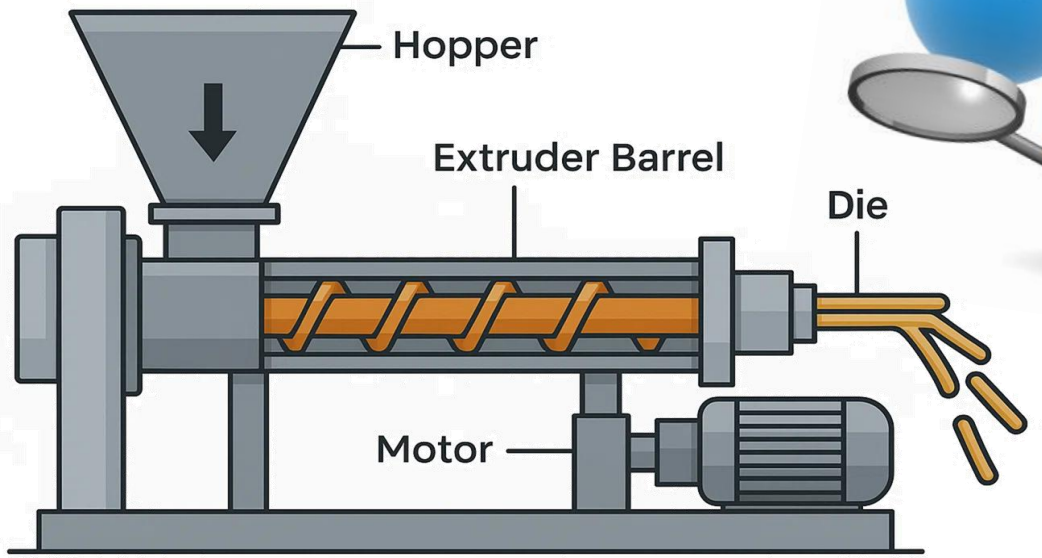


Barrel Sections | End of Barrel | **Die Face** | Treat Cutting

FRAZER-NASH MANUFACTURING

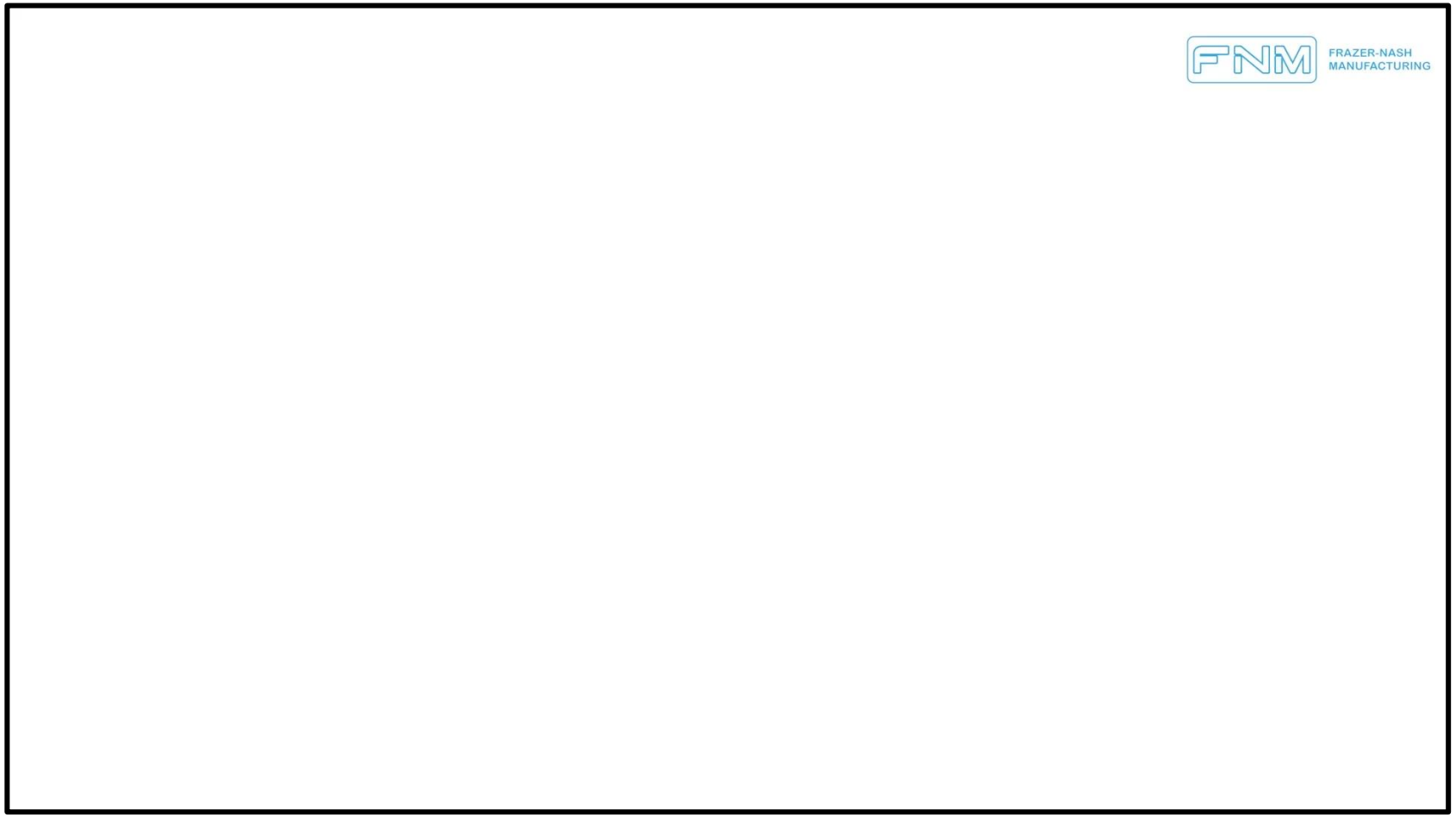
Yield – Product Consistency and Informality

Source of Waste: Achieving even die flow, while extruding multiple ropes is often very difficult. Waste is generated from poor product consistency

Solution: Leveraging a unique geometrical shape, just behind the die face, can modify the extrudate flow characteristics

Die Flow Normalization – Twin Screw Extruders

Die Flow Normalization – Twin Screw Extruders



Die Flow Normalization – Twin Screw Extruders

FRAZER-NASH MANUFACTURING

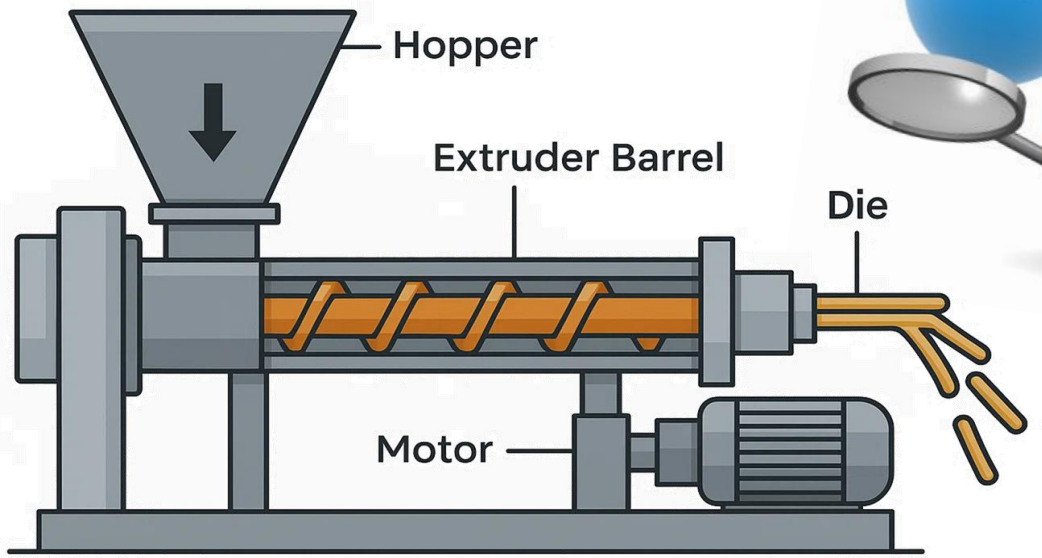
Die Flow Normalization – Twin Screw Extruders

- Even flow is achieved "real time" via an adjustable on-line positioning knob
- Patented FNM technology

Following the Process

FRAZER-NASH MANUFACTURING

PreConditioner

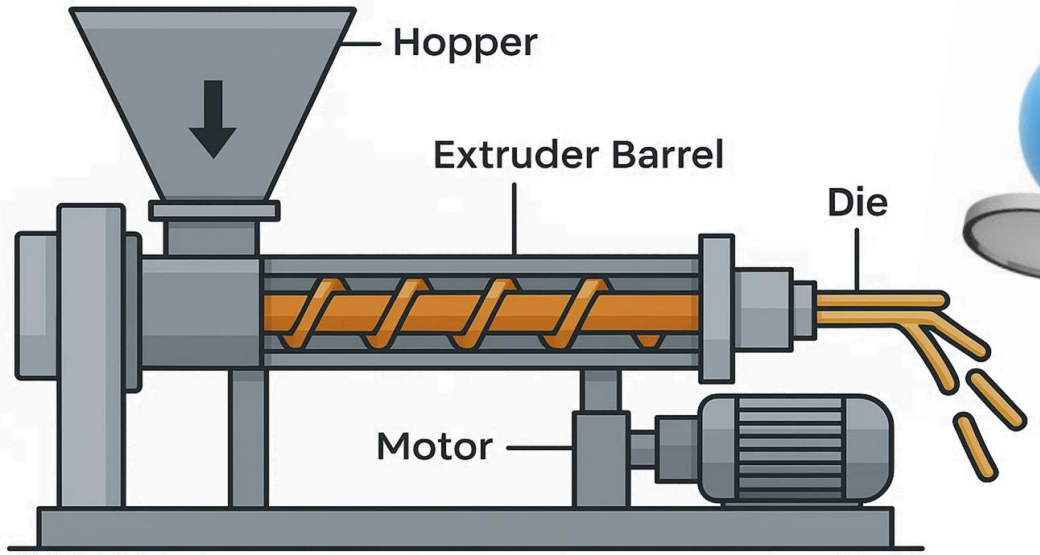


Barrel Sections | End of Barrel | **Die Face** | Treat Cutting

Following the Process

FRAZER-NASH MANUFACTURING

PreConditioner



Barrel Sections

End of Barrel

Die Face

Treat Cutting

FRAZER-NASH MANUFACTURING

Yield – Fines

Source of Waste: "Fines" are a notorious by-product of the entire process. Fines are known to cause issues with drying, re-work, harboring salmonella and finished product aesthetics

Solution: Proper material handling and transferring mechanics are critical . In addition, a proper knife cutting hub at the die is essential.

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Best Practice – Constant Pressure Knife Hub

- Many treats are extruded in a robe / ribbon form
- For smaller sized teats, cut on the die face
  - A well-designed cutter hub is essential
  - Constant cutting pressure at the die
  - Off-set cutting will extend blade life
  - Reversable blade hubs

In - Summary

FRAZER-NASH MANUFACTURING

Multiple "next generation" technologies have been developed that can significantly improve the extrusion process for treats

Waste and inefficacies can occur throughout the extrusion process, so a very systemic and organized approach is needed to drive improvement

Focusing on yield can result in self funding opportunities for cap-ex investments

Questions?

FRAZER-NASH MANUFACTURING

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