

# Extrusion In the Future

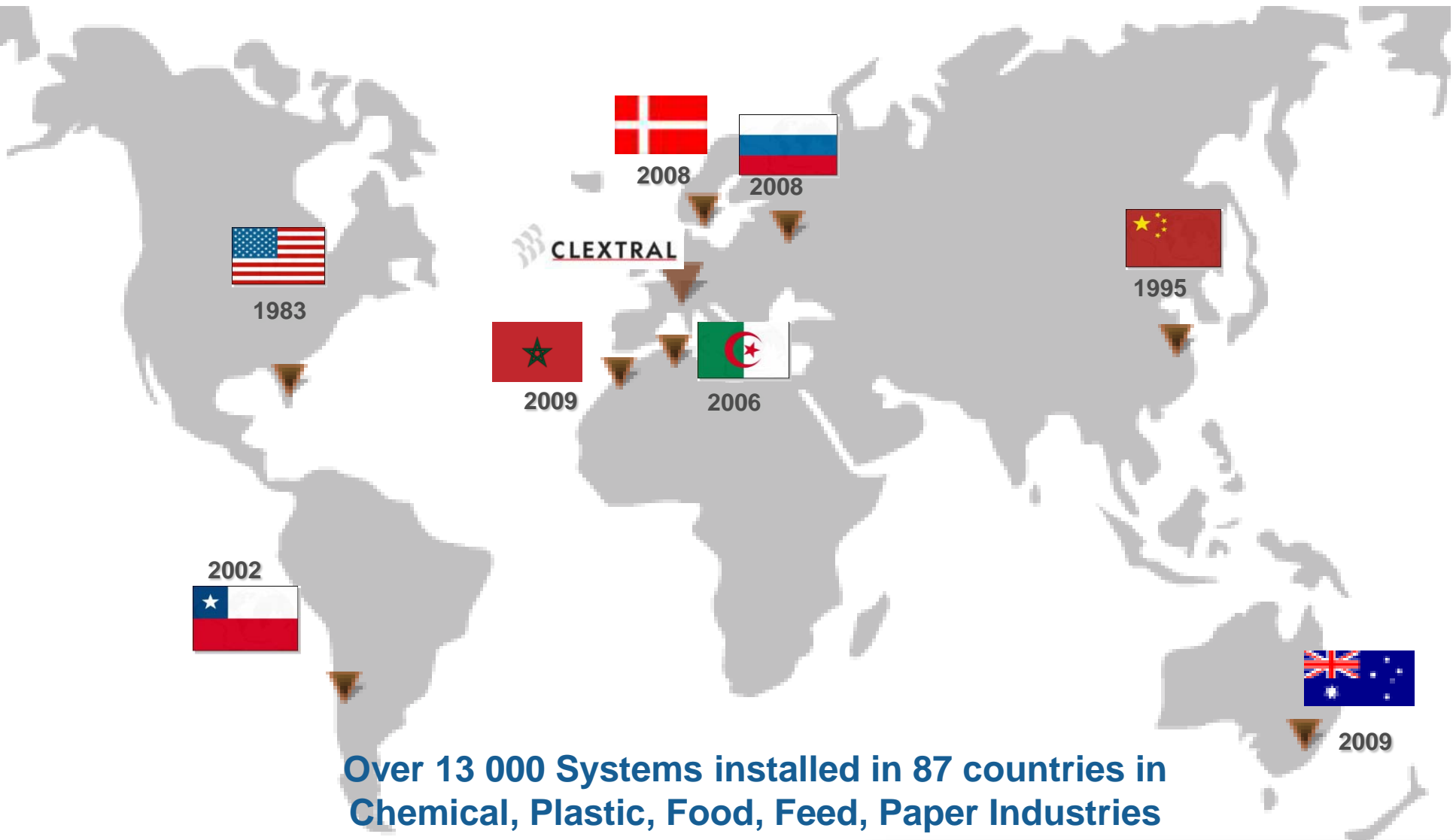
**Gilles Maller**  
VP, Technologies

**Graintec**  
**25<sup>th</sup> Anniversary**

- Activities :** Turn key processing lines  
Extruders, Dryers and ancilliary equipment  
Process assistance & Services  
DKM dosing pumps
- Staff :** 227people
- Locations :** 10 sites (2 in France, 8 abroad) + 2 research centers



# International Presence



Over 13 000 Systems installed in 87 countries in Chemical, Plastic, Food, Feed, Paper Industries

# Food & Feed Applications

**Extruded products using twin screw extrusion technology:** breakfast cereals, snacks, ingredients, baby food, pet food, fish



**Couscous and pasta production lines using the Rotante drying technology**



# Extrusion: Animal Feed



- Fish Feed
  - Pet Food
- From 500 to 28,000 kg/h

First TSE in pet and fish feed industry installed in the early 80's

Cooperation with its customers and scientific partners to adapt equipment / processes automation / recipes



# Plastic & Chemical and Paper Pulp Processes

Twin screw extrusion lines for **plastics chemistry**, plastics recycling, energetic materials, biodegradable materials, cosmetics...



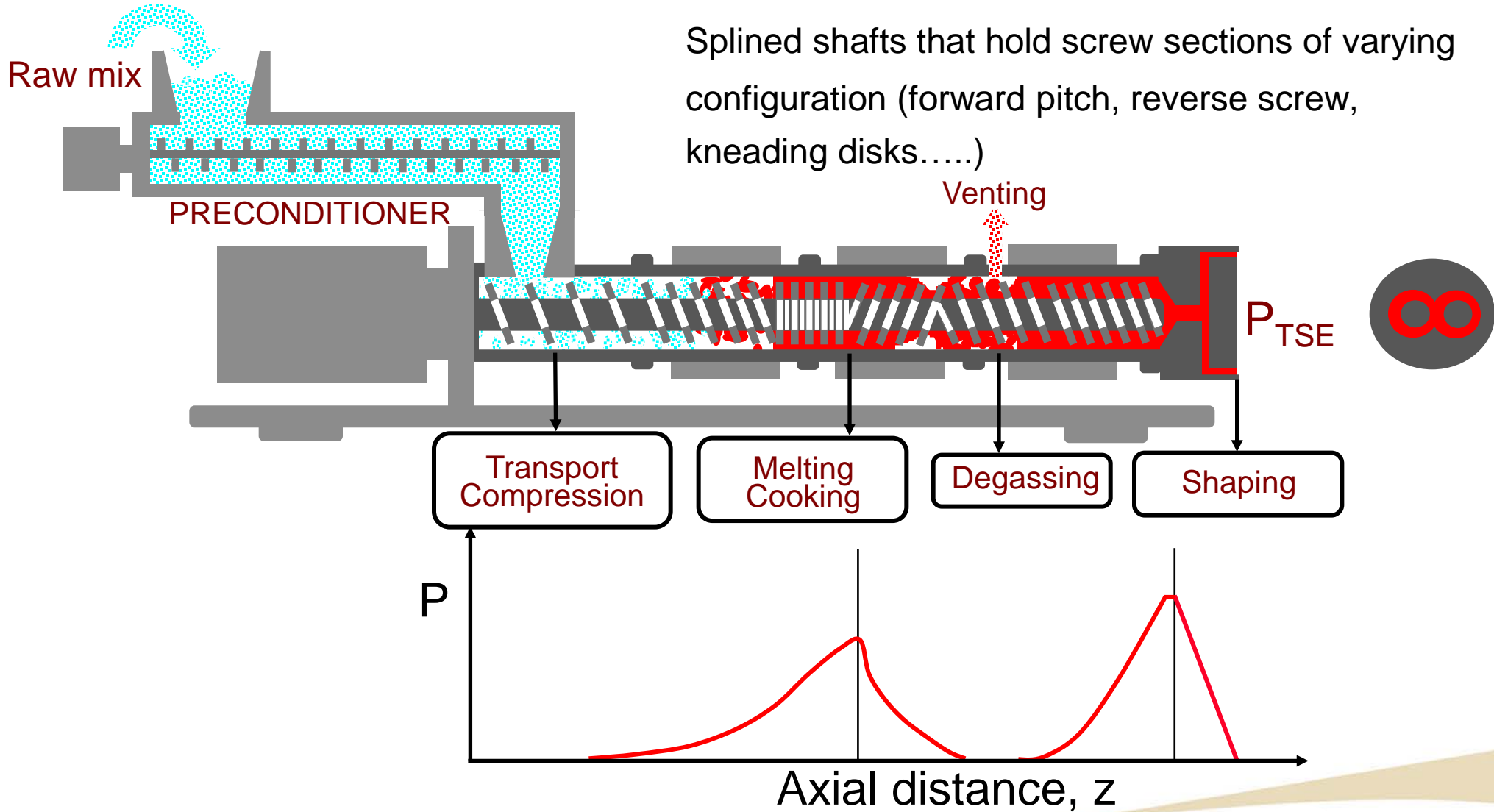
Production lines for **special grade paper pulp** manufacturing (bank notes,...), biomass



# Twin-Screw Extrusion Technology

# Basics of TSE

## Design and Process Characteristics

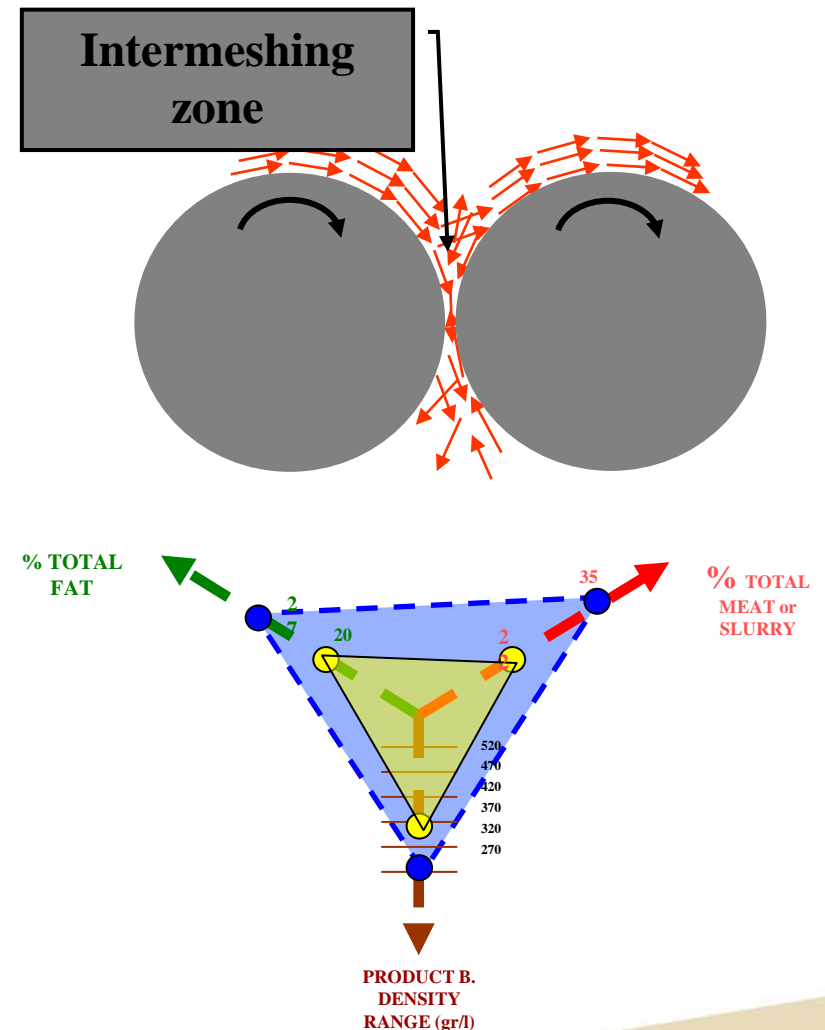


# Twin Screw Extrusion Technology

The two co-rotating intermeshing screws allow:

- Micro and Macro Mixing
- Extensive choice of raw materials
- Tolerance to lipids in raw materials
- Tolerance to variations in the composition of raw materials
- Ingredients (liquid, gas, solids) to be added in-line
- Possibility to do venting/degassing
- Large flexibility in thermo-mechanical cooking: large choice of product textures.

⇒ **Excellent tool to cook, mix and shape complex formulas consistently in one compact unit**



# **Animal Feed Production: multiple challenges lying ahead**

# Health / Food Safety

- More and More focus on Food Safety

**NOTICE OF APPROVAL OF SETTLEMENT OF RECALLED PET FOOD PRODUCTS CLASS ACTION**  
**IF YOU PURCHASED OR YOUR PET(S) CONSUMED**  
**YOU MAY BE ELIGIBLE TO PARTICIPATE IN A CLASS ACTION SETTLEMENT**  
TO: All residents in Canada who purchased pet food on or after March 16, 2007.  
**Hong Kong Finds Tainted Chinese Fish Feed**  
November 2008  
Inspectors in China Find Tons of Tainted Animal Feed

- ⇒ Hygienic Design of Equipment– food grade certification
- ⇒ Premium, Long Lasting Metallurgy
- ⇒ Traceability & Quality of Processing

# Health / Food Safety

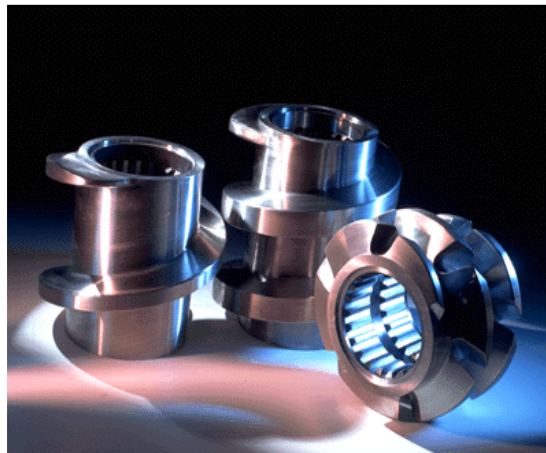
- **Hygienic design and food grade certification**



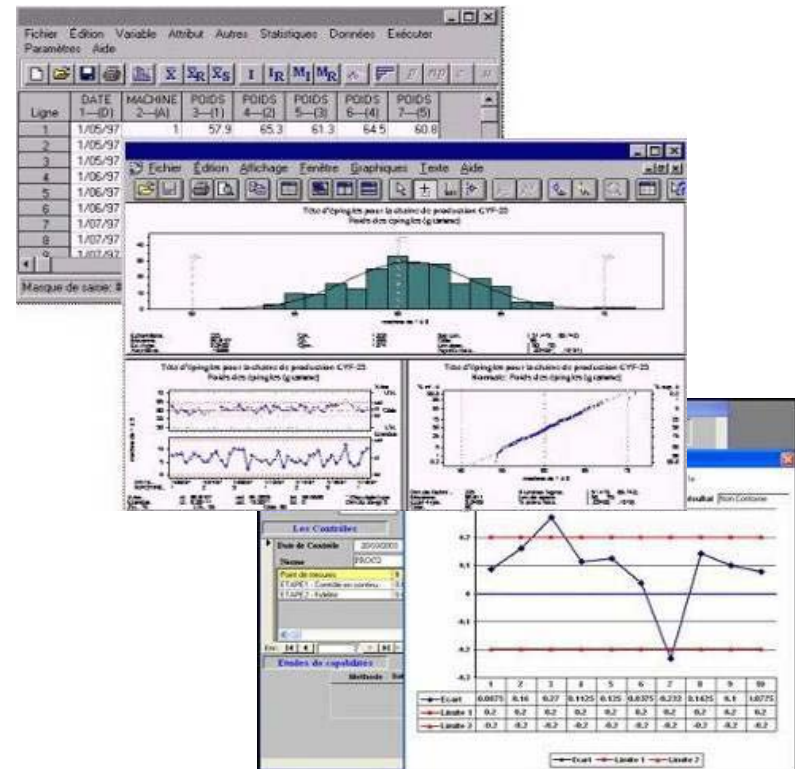
- Sanitary design with no product retention
- No cross-contamination
- CIP
- Access to all the parts, including the screws rapidly
- Both in the preconditioner, chute, extruder, cutter, etc.

# Health / Food Safety

- **Premium Metallurgy**
  - Less wear => less metal residues passed into the feed



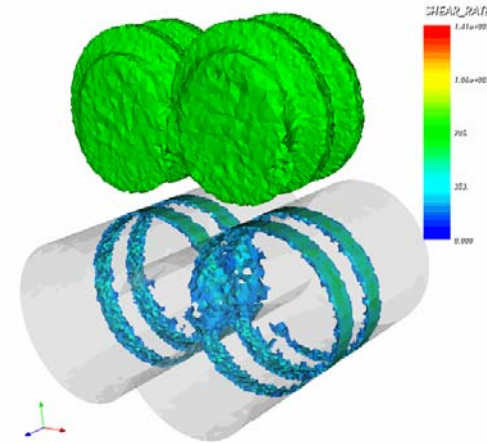
- **Automation – Control - Traceability**



# Environmental Footprint

- **CO<sub>2</sub> footprint – Optimization of Energy Input**

- Cooking intensification
  - ⇒ Right design of screw geometry
  - ⇒ Optimized heat transfer
- Utilization of steam from venting/preconditioner/etc.
- Utilization of wet by-products



- **Less waste**

- Use of raw material (flexibility)
- Quick start-up, shut down
- Fast change over



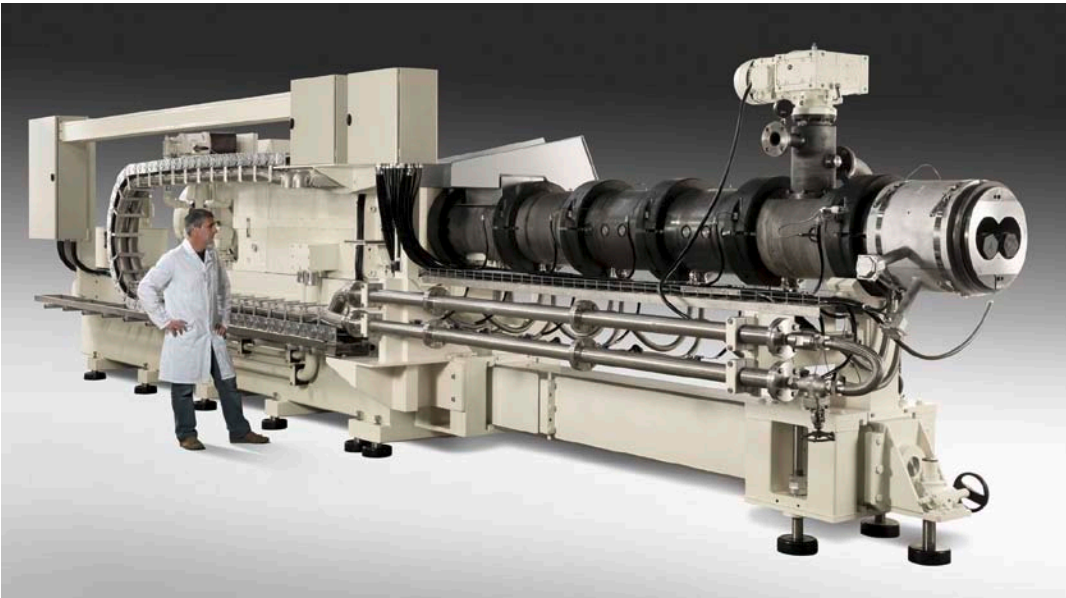
# Total Cost of Ownership

## Big is Beautiful

From 15-28 t/h today to... 30? 40? t/h tomorrow

## ... Small is Beautiful as well

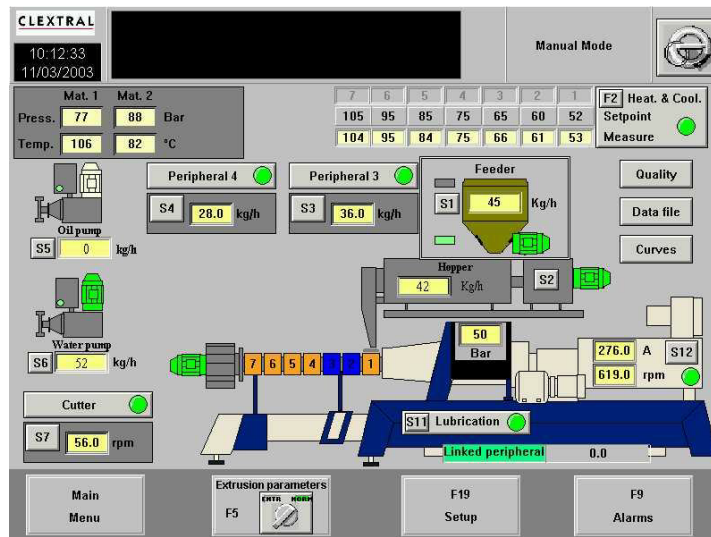
For specialty feed: pet treats, starter feed (0,5 mm), tuna (30 mm)



# Total Cost of Ownership

- **Flexibility**

- Raw material variation
- Range of products
- ⇒ Quick change over (automation / equipment)
- ⇒ Automatic quick ramping up and shut-down
- ⇒ Flexible extrusion units



# Total Cost of Ownership

- **Compact units for a given throughput**

⇒ higher kg/h per screw diameter

– In 1985	BC160	8-10 t/h	dry meal (fish)
– In 2010	BC160	18-20 t/h	dry meal (fish)
– In 80's	BC45	100 kg/h	dry meal (pet)
– In 2010	EV53	550 kg/h	dry meal (pet)

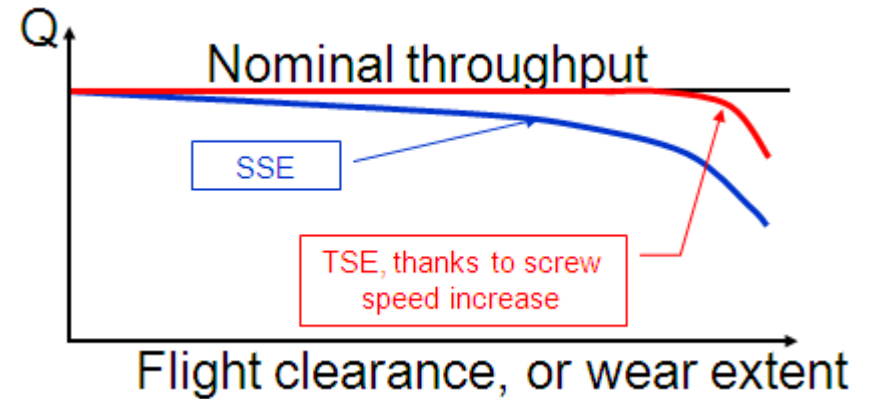
- **Robust, reliable, sturdy extruders**



# Total Cost of Ownership

## ⇒ Premium Metallurgy

- constant processing parameters
- less waste,
- more kg/€
- more uptime



## ●\* Right screws / barrels combination



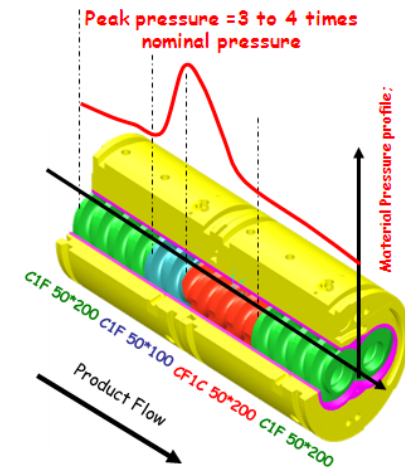
# Quick Time to Market

- **Wide range of raw material and new raw materials**
- **Need to constantly develop new products**

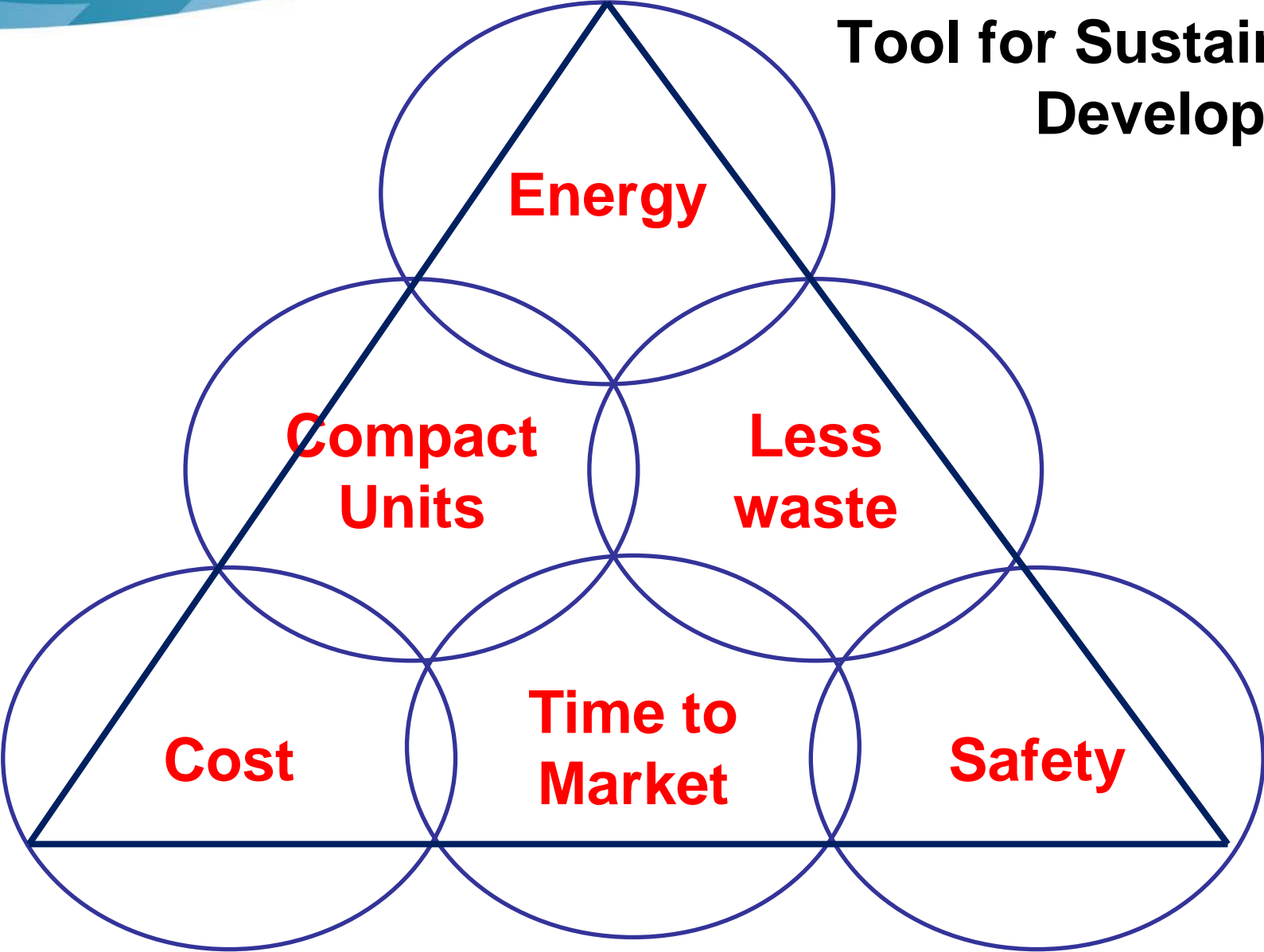
⇒ Flexible, easily scalable unit, simulation tools

⇒ Adapatable Production Tool

⇒ Reduce R&D time and industrial implementation time



# Tool for Sustainable Development



**PLANET**

**Tool for Sustainable  
Development**

**Energy**

**Compact  
Units**

**Less  
waste**

**Cost**

**Time to  
Market**

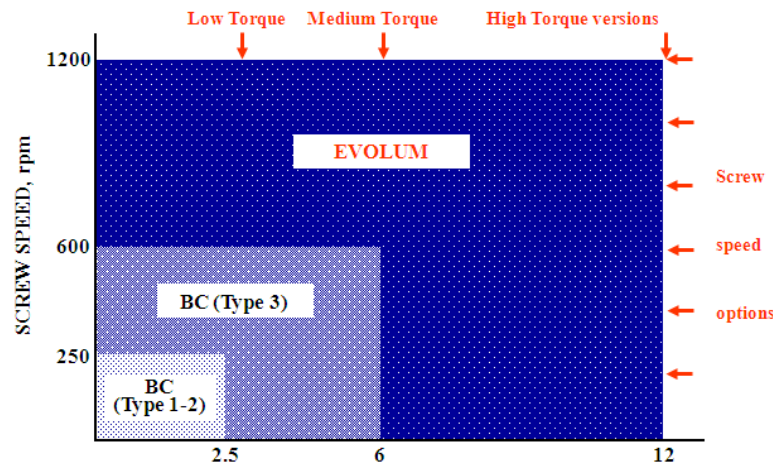
**Safety**

**PROFIT**

**PEOPLE**

# New TSE

## Long history from the 50's



Mechanical improvements (50's => 00's)

Now and in the future => More and more Process oriented machines

**Hygienic Design**

**Intelligent Control**

**In-Built Flexibility**

**TSE of the Future**

**Acceptable cost**

**Reliable, Rugged**

**No wear**

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