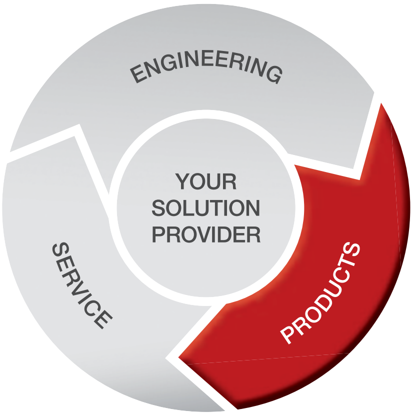
FARREL POMINI

continuous compounding systems

FMP™, FARREL MELT PUMP | UNDERWATER PELLETIZER

The FMP™, Farrel Melt Pump is a combination of post reactor polymer processing knowledge and melt pump technology. The FMP™ provides high capacity, energy efficient polymer finishing lines.

Capacity, accuracy and durability are the hallmarks of FARREL POMINI Pelletizers. The pelletizers incorporate numerous innovative processing, mechanical and control features that assure consistent performance, quality pellet output, efficient operation and simplified maintenance.



FMP™ Capacities*

Specification	Units	FMP-30	FMP-50	FMP-70	FMP-80	FMP-100
Nominal Capacity	Lbs/hr	30,000	50,000	70,000	80,000	100,000
	kg/h	13,640	22,730	31,820	36,360	45,450
Maximum Capacity	Lbs/hr	40,700	58,300	80,300	92,400	132,000
	kg/h	18,500	26,500	36,500	42,000	60,000
Volumetric Displacement	In^3/rev	633	836	1,155	1,320	2,000
	L/rev	10.37	13.70	18.94	21.65	32.8
Typical Installed Power	HP	400	600	800	940	1,200
	kW	300	450	600	700	900
Housing Dimensions	Inches	26 x 34 x 35	29 x 41 x 42	31 x 46 x 46	31 x 48 x 46	36 x 50 x 50
	CMs	65 x 85 x 88	73 x 103 x 105	78 x 115 x 115	78 x 120 x 115	92 x 127 x 127
Weight	Lbs	8,100	10,200	15,200	15,860	20,850
	kgs	3,680	4,635	6,900	7,210	9,480

* All production rates should be factory verified

FMP™, Farrel Melt Pump

In any post reactor polymer finishing line, melt pressurization is required for filtration and pelletizing. Typically, an extruder has been used for this processing step, with its screw geometry tailored to the polymer's rheological properties, required discharge pressure and production capacity. Due to drag induced flow, much of the energy needed to drive an extruder is dissipated into the melt causing an undesired temperature rise.

By comparison, the FMP™, Farrel Melt Pump provides melt pressurization with a much greater degree of efficiency due to:

- Positive displacement feature
- Minimal back flow
- Limited energy dissipation

These operating characteristics have created multiple applications for the FMP™ in high capacity reactor finishing lines. In these production lines, the FMP™ is connected directly to the finishing reactor flange (in the case of a "hot melt" discharge) or to an FCM™, Farrel Continuous Mixer or LCM Continuous Mixer in the case of granular or powder reactor discharge.

In addition to meeting the requirements of high capacity reactor finishing lines, the FMP™ does not alter the rheological properties of the polymer, thereby assuring consistency in physical characteristics.

Construction

The custom designed inlet flange of the pump housing receives the polymer melt that is distributed over two intermeshing gears. The tangential feed pockets force the polymer melt into the tooth cavities and the intermeshing, high precision gears carry the polymer melt along the periphery of the housing bores.

Where the gears intermesh, the polymer is squeezed out of the gear tooth cavities toward the discharge opening. Because of the close tolerances between the gear profiles and the housing, a high volumetric efficiency can be maintained over wide ranges of pressure and temperature.

The gear shaft journals are supported by sleeve bearings which are lubricated by polymer melt tapped from the high pressure discharge. The polymer lubricant is collected on the opposite ends of the bearings and returned internally to the suction side of the FMP™. Each shaft extension is equipped with seals to prevent polymer leakage.

For standard polymer finishing line applications, the FMP™ employs a single drive shaft connected to a variable speed motor and gearbox. With this drive arrangement, the driven gear shaft turns the idler gear in the pump housing.

For applications with high melt viscosity and/or polymer melts with low lubricity, an alternative drive arrangement with two gear shaft extensions is recommended. In this case, both melt pump rotors are connected to a UNIDRIVE gearbox and variable speed motor via special drive spindles that ensure the gears in the melt pump operate in a turned position without metal-to-metal contact. The drive train components are matchmarked during assembly to ensure contact free operation of the gears in the pump housing.

Underwater Pelletizer

The Evolutionary Advantage

The FARREL POMINI Underwater Pelletizers incorporate numerous innovative processing, mechanical and control features that assure consistent performance, quality pellet output, efficient operation and simplified maintenance.

Models to Meet a Wide Range of Production Requirements

The largest pelletizer is in commercial operation at production rates in excess of 110,000 lbs/hr. (50 mt/hr.) easily meeting the capacity of large volume polymer production plants. Pelletizers are available in a number

FMP™ Applications

	Melt Inlet Range (MI2)	
Polymer & Type	**Low**	**High**
Polyethylene		
• LDPE	0.10	100
• EVA/PE Copolymers	1.00	1,000
• LLDPE	0.20	100
• HDPE	0.01	100
Polypropylene	0.20	100
Polystyrene	1.00	20

of sizes, covering production capacity from a few thousand pounds per hour for small compounding lines to extremely high volume requirements.

Technologically Advanced Features for Increased Productivity

The standard electrically powered "C" model pelletizer has a floor mounted, wheeled carriage on V-rails. As an option for smaller pelletizers, the hydraulically powered "H" (hinged) model is also available. Both models incorporate technological advances such as: a quick opening cutting chamber, hydraulic locking and unlocking, hydraulic opening and closing of the pelletizer and automatic retention of the cutter shaft alignment. Standard options include: self-aligning knife holder, auto-infeed system and automated start-up.

Custom Designed Pellet Plates Meet Specific Needs

The pellet plate is one of the most critical features of an underwater pelletizer. All pellet plates are custom designed to meet specific processing requirements. The cutting face can be provided with a selection of different hard metal surfacing materials in the form of tiles, nibs, segments or as a solid coating. The internal heating configuration is custom-designed based on the application and the available heating medium (either steam or other thermal fluid).

With the flexibility offered by pellet plate designs, there are few limitations to applications for a pelletizer with a proven track record for a wide range of polymers and viscosities.

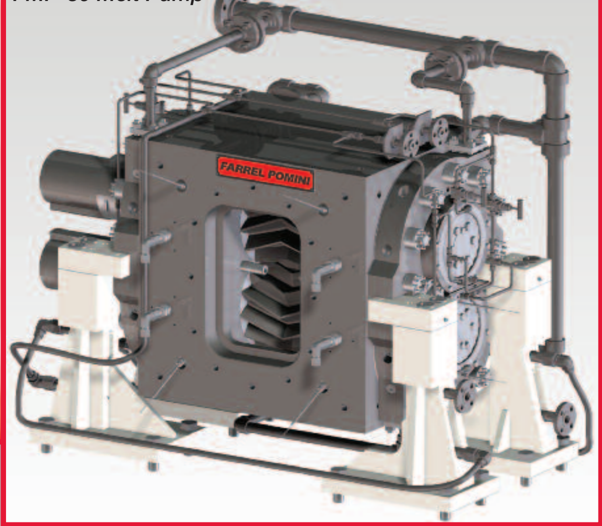
Cutter Shaft and Knife Alignment Mechanism

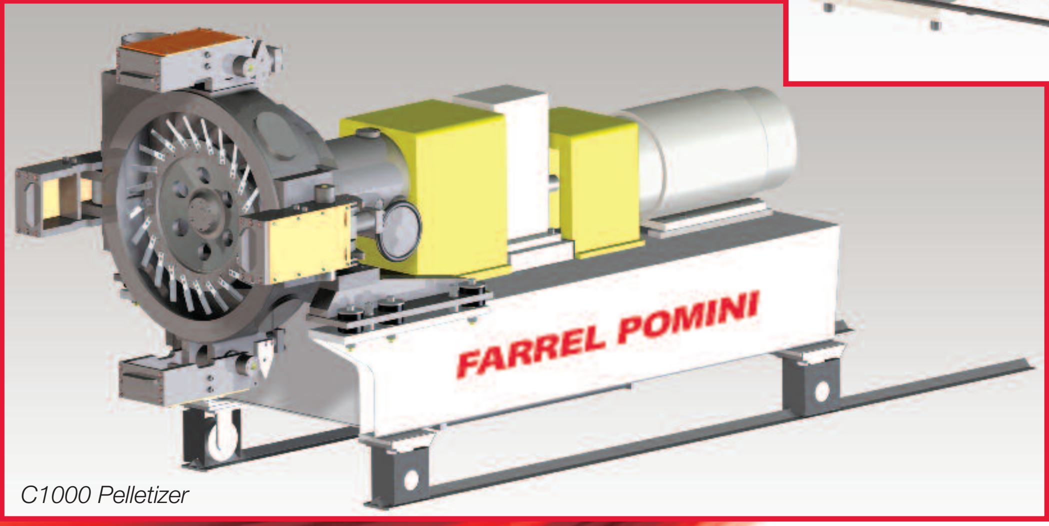
Another critical requirement for a superior pelletizer design is its ability to accurately align the knives to the pellet plate and to maintain this alignment during operation. This requirement has to be met for producing clean-cut pellets and obtaining optimum knife life. FARREL POMINI Pelletizer design meets this challenge with a special mechanism that allows for precise alignment of the cutter shaft axis to the cutting face of the pellet plate.

Alignment Retention

Hydraulically activated mechanical clamps lock the water chamber and cutter housing assembly to the pellet plate. This unified assembly is attached to the pelletizer carriage by a mounting plate on elastomeric mounts. This "floating deck" construction maintains critical

FMP-50 Melt Pump





C1000 Pelletizer

alignment while compensating for minor head orientation deviations caused by temperature changes during operation. This system provides the additional advantage of minimizing downtime for regular maintenance.

Design Features

Water Chamber
- Stainless steel
- Rigid, heaving walled casting
- Streamlined flow contours
- Small volume allows for rapid filling
- Inlet water flow directed at knives and cutting face
- Tangential water outlet
- Access ports for alignment checks
- Observation windows in outlet
- Pressure relief device
- Hydraulic locking

Knife Positioning
- Standard, manual and semi-automatic
- Automatic self compensating by pressure control (optional)
- Pneumatic/hydraulic advance system

Cutter Housing Assembly
- Precision bearings
- Zero clearance shaft advance support
- Maintain alignment to pellet plate during operation

Head Assembly
- Rigid pellet plate support
- Streamlined polymer flow

Pellet Plate
- Custom designed for application
- Low polymer pressure drop design
- Cutting face design options
- Internal heating design options

Underwater Pelletizer Capacity*

	Maximum Capacity (**)			
	Polyethylene		Polypropylene	
Model	Lb/hr	kg/h	Lb/hr	kg/h
220	9,000	4,000	5,500	2,500
350	20,000	9,000	13,000	6,000
400	28,000	13,000	19,000	8,500
500	44,000	20,000	35,000	16,000
650	64,000	29,000	50,000	23,000
800	85,000	39,000	72,000	33,000
1,000	120,000	54,000	95,000	43,000
1,200	145,000	66,000	Consult FARREL POMINI	

(**) Actual capacity is dependent on material type (ie, LDPE, LLDPE or HDPE) and grade as well as pellet size specifications.

* All production rates should be factory verified

Knives
- Premounted on knife rings
- Rapid knife change
- Knife ring options for different knife quantity
- Knife material options
- Knife holder design options

Pelletizer Carriage (C-Series)
- Adjustable casters for carriage alignment
- Floating deck
- Hydraulic opening/closing
- V-rails to insure repetitive alignment

Typical Underwater Pelletizer Applications

Applications include the following base resins, including co-polymers, alloys and custom compounds:

TLDPE	ABS
EVA-LDPE	SAN
(copolymers)	PVC
LLDPE	PBT
HDPE	EPDM
PP	EPM
PS & HIPS	TEO

Optional Design Features

Many design options are available to allow optimization of a pelletizer for a given application. Including: Pellet Plate (heat exchanger, heat channel, insulated heat channel); Cutting Face Surface (tungsten carbide: tiled, nib or solid coating or titanium carbide: tiled, nib or segments); Heating Medium (steam, oil); Cutter Assembly (rigid knife holder, self-aligning knife holder); Knife Material (tool steel, stainless steel, powder metallurgy composite, titanium carbide insert); Cutter Shaft Positioning Control Method (manual adjustment, motorized adjustment, pressure control); Monitoring Knife Position (local mechanical read-out, local and remote electronic display).

Concept & design: Welke Consulting Group, Siegen, Germany

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