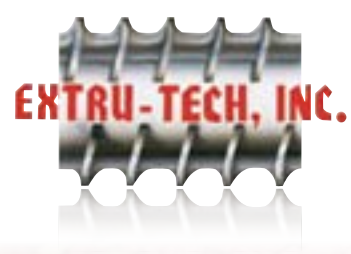
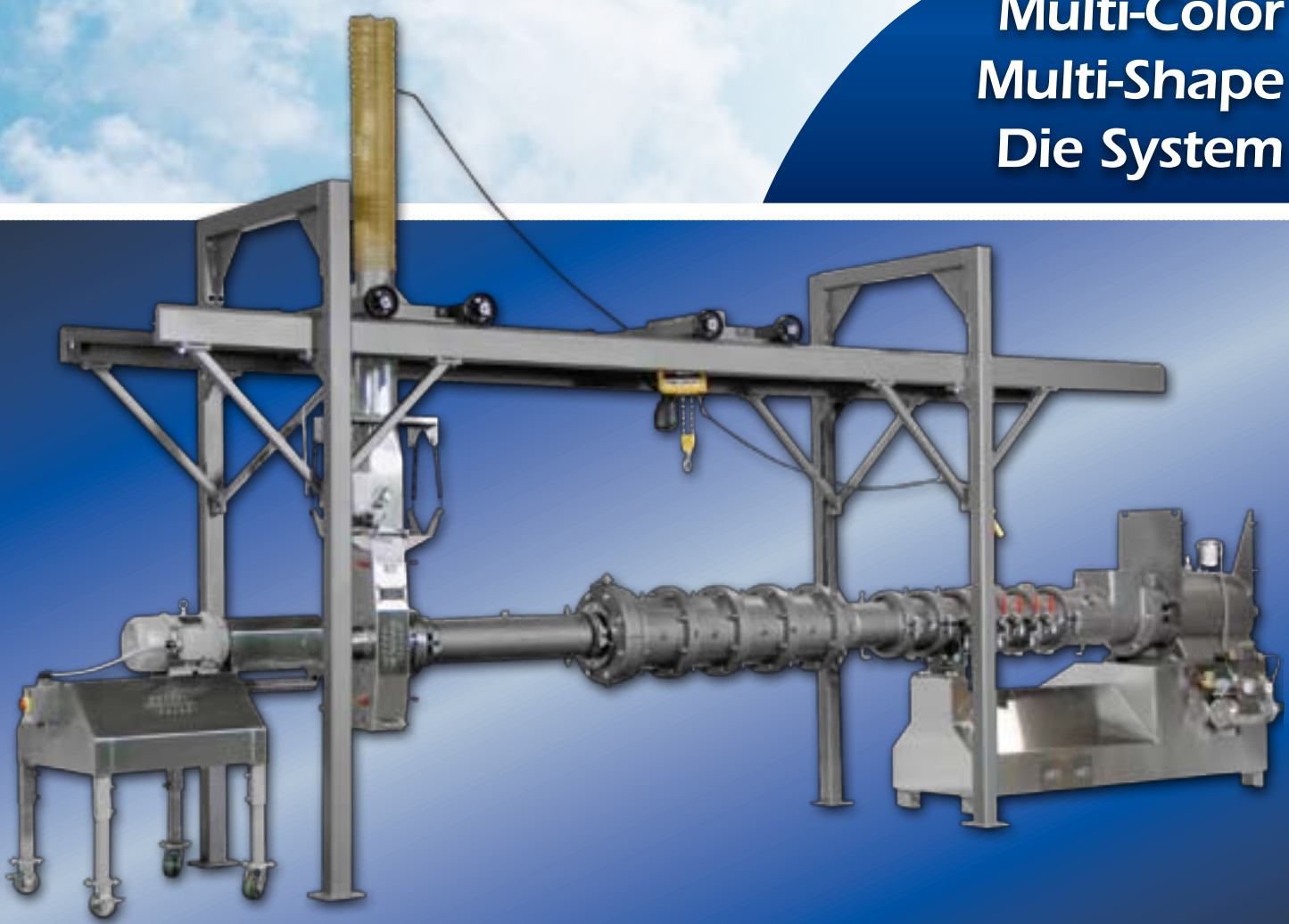




# Multi-Color Multi-Shape Die System



# Continuous and simultaneous production from one extruder.



## Multiple colors and multiple shapes . . . simultaneously.

Competitive market pressures require continual innovations in production technology to maintain an edge over the competition. The Multi-Color/Multi-Shape Die System from Extru-Tech, Inc. is designed to provide immediate return on investment and provide a technical advantage the competition simply can't match using existing technology.

The Multi-Color/Multi-Shape Die System (U.S. Patent No. 6719448) is exclusive technology engineered specifically for single screw cooking extruders. The revolutionary design of the die assembly allows the production of multiple colors and multiple shapes simultaneously.

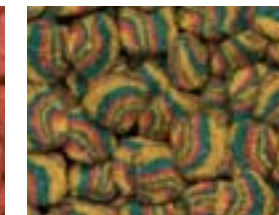
- The ability to run multiple colors in a single production run completely eliminates the need to stop mid-run to clean up and change die color.
- Running multiple shapes in the same production run eliminates mid-run die changes.
- Multi-Color heads can be completely removed from the extruder barrel in 10-15 minutes, and the extruder can be restarted running single-color, dry kibble at full capacity immediately, minimizing switch over downtime.

- The Multi-Color/Multi-Shape system eliminates the costly expense of blending and batching multiple runs to attain the desired finished product color and shape combination.
- The die system is available in 2-, 3-, and 4-color and shape configurations and can produce marbled and bi-color product in both dry and soft-moist.
- All systems are designed to use one die plate and cutter head assembly.
- Liquid dye is injected into the die assembly through high-pressure metering pumps that ensure the highest quality finished product.
- Specific carriers can be used to alter the texture of individual components of a product collection.



**2-color**

Product divided into 2 or 4 equal flows, using 2 to 4 heads



**3-color**

Product divided into 3 or 4 equal flows, using 3 to 4 heads



**4-color**

Product divided into 4 equal flows, using 4 heads



**Marbled**

Single component (dry or soft-moist) with a random mix of different colors



**Bi-color**

Single component (dry or soft-moist) with 2 different colors meshed with a specific design

## Multi-Color/Multi-Shape Die System vs. Traditional Blending or Multiple Extruder Setups

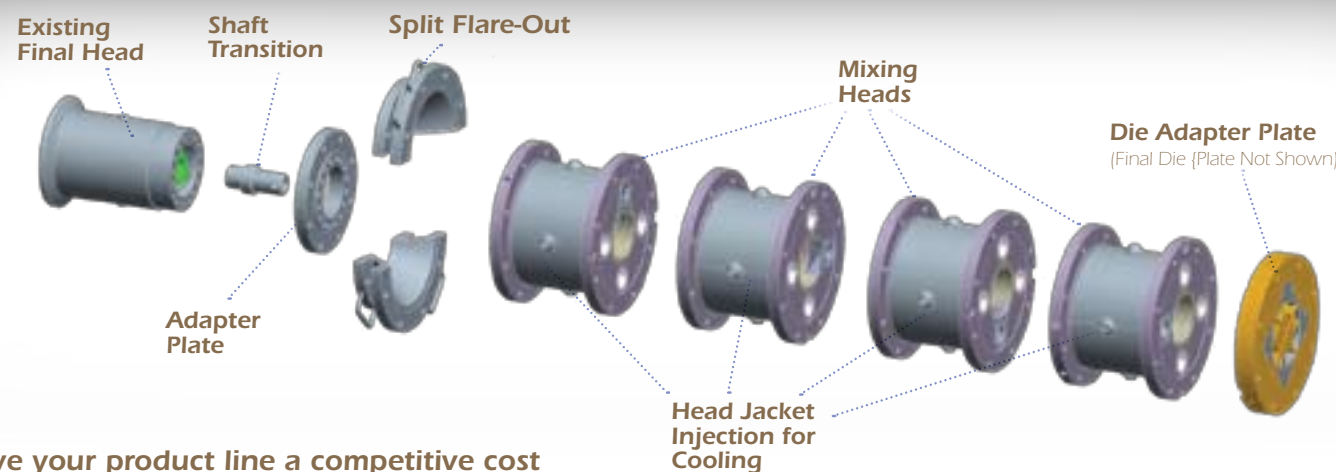
The Multi-Color/Multi-Shape Die System eliminates the costly expense of blending and batching multiple runs to attain the desired finished product color and shape combination.

Extru-Tech has validated the versatility and functionality of the MC/MS Die System through independent production collaborations and research conducted in its Corporate Innovation Center. This testing and research showed in Table 1 that – in comparison to a typical, traditional blending bin configuration –

the 4-color MC/MS Die System produced 558 total extruded tons to the traditional setup's 349 tons, while suffering less than half the average downtime of the traditional setup. When correlated to dollars, this difference goes straight to the bottom line.

### And speaking of the bottom line...

See Table 2 to compare some estimated costs of the MC/MS Die System to traditional blending and multi-extruder production environments.



Give your product line a competitive cost advantage the competition simply can't match.

Table 1: MCMS vs. normal configuration

	Normal extrusion configuration				4-color MCMS
	August 2	August 9	August 16	Average	August 22
Extruded tons	378	321	348	349	558
Tons/hour with downtime	5.3	4.5	5.4	5.0	5.5
Tons/hour without downtime	6.8	6.5	6.4	6.6	5.9
Downtime hours/week	16.5	22.7	9.3	16.2	7.0
% downtime	22.9	31.5	14.5	22.9	6.9

In terms of total extruded tons, the MCMS beats a traditional extrusion setup.

Table 2: Comparing three production options

	Blending system	4-color MCMS	Multiple extruders
Space requirement	400 ft <sup>2</sup>	36 ft <sup>2</sup>	1,000 ft <sup>2</sup>
Ease of install	Medium	High	Low
Ease of use	High*	High**	Low
Flexibility	High*	Medium	High
Energy use	Low	Low	High
Waste generation	5-7%	1%	3-5%
Consistency	Low	Very high	Low

The MCMS's advantages over other options are clear. \*If PLC controlled. \*\* With manual controls, but better with PLC controls.

# Multi-Color/Multi-Shape Die System Specifications



## Extruder w/CM525 System Sizing Specifications

### 48.6 HP per ton

4,400 lbs/hr max per head

4,400 X 4 Heads = 17,600 lbs/hr max per 4-Head system

### Example

E750 w/250 HP Extruder Motor using 4-Color Setup

250 HP / 48.6 HP/Ton/Hr = 5.14 Ton or 10,280 lbs/hr

### 40 kW per Mton

2,000 kg/hr max per head

2,000 X 4 Heads = 8,000 kg/hr max per 4-Head system

### Example

E750 w/250 HP Extruder Motor using 4-Color Setup

186 kW / 40 kW/MTon/Hr = 4.66 MTon or 4,660 kg/hr

### 85 HP per ton

4,400 lbs/hr max per head

4,400 X 2 Heads = 8,800 lbs/hr max per 2-Head system

### Example

E750 w/250 HP Extruder Motor using 2-Color Setup

250 HP / 75 HP/Ton/Hr = 3.3 Ton or 6,600 lbs/hr

### 70 kW per Mton

2,000 kg/hr max per head

2,000 X 2 Heads = 4,000 kg/hr max per 2-Head system

### Example

E750 w/250 HP Extruder Motor using 2-Color Setup

186 kW / 60 kW/MTon/Hr = 3.0 MTon or 3,000 kg/hr

## Multi-Color / Multi-Shape Die System Development Data

### Pet Food Formula #1- 2 Color Multi-Shape

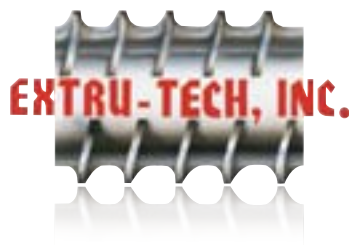
	001	004	005	006
Feed Rate (lbs/hr) / (kg/hr)	4,427 / 2,008	6,600 / 3,000	7,680 / 3,485	8,820 / 4,000
% of Rated Capacity	40.2	60	70	80.2
Wet Density (lbs/ft <sup>3</sup> ) / (g/l)	28 / 448	23 / 367	25 / 394	30 / 486
Load (% FLA)	51	62	68	77
SME (kW/hr*ton)	46	40	36	32.5

### Pet Food Formula #2- 2 Color Multi-Shape

	001	002	003	004
Feed Rate (lbs/hr) / (kg/hr)	4,400 / 2,000	6,600 / 3,000	8,100 / 3,700	8,780 / 3,980
% of Rated Capacity	40.3	60	73.3	79.8
Wet Density (lbs/ft <sup>3</sup> ) / (g/l)	25 / 400	23 / 410	25 / 395	25 / 395
Load (% FLA)	48	77	82	79
SME (kW/hr*ton)	43.1	47.3	38.1	39.4

### Pet Food Formula #1- Bi-Color / Marbled

	003	004	005	002
Feed Rate (lbs/hr) / (kg/hr)	3,300 / 1,500	3,980 / 1,800	4,830 / 2,190	5,500 / 2,500
% of Rated Capacity	30.1	36.1	43.9	50.2
Wet Density (lbs/ft <sup>3</sup> ) / (g/l)	18 / 282	22 / 345	22 / 350	21 / 341
Load (% FLA)	59	81	92	84
SME (kW/hr*ton)	70	80.7	77.4	63



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