Food Packaging Manufacturing

Cost Economics, Substrates and Operational Benchmarks

Prepared by Rospex Holdings LLC

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Executive Summary Edition

Market Overview

Food packaging manufacturing is a raw-material-intensive, capital-intensive business where operational excellence - not just scale - determines margin outcome. Across all plastic substrates, resin represents 55 to 70% of total manufactured cost. A 10% resin move translates directly into a 5 to 7% manufactured cost change before pass-through mechanisms. Paper and fiber substrates trade lower raw material intensity (40 to 55% of COGS) for higher conversion cost - energy runs 10 to 15% of total cost in integrated mills. The fundamental economics are not difficult to understand, but they are easy to underwrite incorrectly if cost stack assumptions are wrong at entry.

The most commonly misunderstood aspect of packaging manufacturing economics is the OEE gap between world-class operators and average operators using identical equipment. A world-class blown film line runs at 85 to 88% OEE; an average line runs 70 to 75%. On a $200 million revenue plant, that 13 to 15%age point OEE difference is worth $3 to 8 million of EBITDA annually - and it is entirely addressable through changeover reduction (SMED), operator training, and inline quality system investment. This is the first place experienced packaging operating partners look post-acquisition.

Substrate Cost Summary

Substrate	Resin/Fiber % COGS	Conversion % COGS	Freight/Energy	Gross Margin Range
PP thermoform	55-65%	25-30%	10-15%	15-22%
PET/RPET thermoform	60-70%	20-25%	10-13%	15-22%
EPS/PS foam	50-60%	25-30%	10-20%	12-18%
Molded fiber/pulp	35-50%	30-40%	13-23%	14-20%
PE blown film rollstock	60-70%	20-25%	10-15%	12-18%
BOPP/BOPET film	50-65%	25-35%	10-20%	18-28%
Multilayer barrier laminate	55-70%	20-30%	10-15%	22-32%
Paper/paperboard carton	40-55%	25-35%	18-27%	16-24%
Retort/high-barrier pouch	55-65%	25-30%	13-20%	22-30%

Procurement Scale Economics

The resin procurement advantage enjoyed by Tier 1 buyers (annual spend above $500 million) versus Tier 3 buyers (below $50 million) is 8 to 18 cents per pound - or $5 to $10 million of EBITDA on a 100 million pound per year converter. This is the primary financial mechanic driving PE packaging roll-up strategies: aggregating resin purchasing from Tier 3 into Tier 1 pricing generates 30 to 50% of total synergies before any operational or commercial improvement.

Key resin concentration risk: EVOH (the oxygen barrier polymer used in most meat and produce packaging) is supplied globally by only two companies - Kuraray and Mitsubishi Chemical. Any converter relying on EVOH for more than 25% of its barrier structure should maintain dual-sourcing agreements and minimum inventory buffers of 60 to 90 days, particularly during periods of allocation constraint, which have historically occurred in 2017 and 2021.

Operational Benchmarks

World-class EBITDA margins by business type: commodity converters (standard PP cups, basic PE rollstock) 8 to 12%; mid-tier custom converters (printed flexible, custom thermoform, QSR programs) 12 to 18%; specialty/barrier converters (EVOH multilayer, retort, MAP protein) 18 to 25%; system sellers with equipment and consumable recurring revenue (Sealed Air Cryovac model) 20 to 22%. Revenue per employee benchmark: world-class $500,000 to $750,000; industry average $350,000 to $500,000.

On-time delivery performance is the most commercially sensitive operational metric in food packaging. World-class: above 97%. Industry average: 92 to 95%. Below 90% is a leading indicator of customer attrition within 12 to 18 months. Customer complaint rate benchmark: below 3 per million units for world-class operators; above 15 per million indicates a quality system failure requiring immediate intervention.

Investment Implications

From an investment standpoint, the most powerful operational value-creation levers in food packaging - in order of achievable EBITDA impact - are: (1) resin procurement aggregation through scale, delivering $5 to $15 million on a $300 million revenue platform; (2) OEE improvement through changeover reduction and quality system investment, delivering $3 to $8 million on the same base; (3) SKU rationalization reducing the bottom-20-percent tail of low-volume SKUs, delivering $1 to $3 million; (4) working capital cash conversion cycle improvement, unlocking $10 to $30 million in permanent cash improvement on a $300 million revenue platform. These levers are sequentially additive and largely independent of each other.

Market Fragmentation and Operational Benchmarks - Reference Table

Metric	Benchmark
OEE world-class (blown film extrusion)	85-88%
OEE industry average (printing)	55-65%
Maintenance capex as % net PP&E (well-maintained)	4-8% annually
Capex per tonne (integrated flexible converter, new)	$1,500-3,500/tonne annual capacity
7-layer blown film line (W&H VAREX II) installed	EUR 8-14 million
10-color CI flexo press installed	EUR 4-7 million
Solventless laminator installed	EUR 1.5-2.5 million
Gravure cylinder set (10 colors, new design)	EUR 8,000-25,000
Revenue per employee (world-class converter)	$500,000-750,000
Cash Conversion Cycle (world-class)	25-40 days
Cash Conversion Cycle (industry average)	45-70 days
EBITDA margin (specialty/barrier converter)	18-25%
EBITDA margin (commodity converter)	8-12%

Full research report with detailed substrate cost models, equipment OEM comparisons, procurement tier analysis, and complete citations available upon request from Rospex Holdings LLC.