**Lightweight Rigid Container Project: Final Review**

**INTERNAL DOCUMENT - CONFIDENTIAL**  
**Packaging Engineering Department**  
**Date: February 28, 2024**

**Project Overview**

The Lightweight Rigid Container Project was initiated in April 2022 with the goal of reducing plastic content in our rigid containers by 20% while maintaining structural integrity and consumer experience. This final review documents the outcomes, learnings, and recommendations for future development and scaling.

**Key Achievements**

1. **Material Reduction Success**: Achieved 23.2% reduction in plastic content across three container formats (exceeding 20% target)
2. **Structural Performance**: Maintained 96% of original stacking strength and 98% of impact resistance
3. **Consumer Acceptance**: 90% of test market consumers reported no difference in perceived quality
4. **Cost Savings**: $2.87M annual savings in material costs at full implementation
5. **Carbon Footprint**: 18.5% reduction in carbon footprint (materials + transportation)

**Technical Development Summary**

**Design Innovations**

| **Design Feature** | **Benefit** | **Challenge Addressed** |
| --- | --- | --- |
| Reinforced corner geometry | Maintained stacking strength with thinner walls | Structural integrity |
| Microtexturing on exterior surfaces | Improved grip and perceived quality | Consumer experience |
| Variable wall thickness optimization | Reduced material use while preserving critical structural elements | Material efficiency |
| Modified rim structure | Ensured reliable sealing | Product protection |

**Material Optimization**

* Base resin changed from PET to rPET blend (30% post-consumer content)
* Wall thickness reduced from 0.58mm to 0.44mm (24% reduction)
* Custom slip agent developed with Polymer Solutions Inc. to maintain production speeds

**Production Implementation**

* Line modifications completed on 4 of 7 production lines
* Cycle time increased by only 3.2% (vs. projected 7%)
* Reject rate initially increased to 5.2%, now stabilized at 2.8% (within 0.3% of baseline)
* Retooling costs recouped through material savings in 7.3 months

**Market Testing Results**

Tests conducted in Denver, Charlotte, and Phoenix markets (September 2023 - January 2024)

**Quantitative Findings**

* **Sales Impact**: No statistically significant change in sales volumes (+0.7%, p=0.62)
* **Consumer Complaints**: No increase in packaging-related complaints
* **Return Rate**: Unchanged from baseline (0.42% vs 0.39% baseline)
* **Shipping Damage**: Slight increase in transit damage (1.24% vs 0.96% baseline)

**Qualitative Feedback**

* "No noticeable difference in packaging quality" - 87% of surveyed consumers
* "More environmentally friendly" - identified as a benefit by 62% of consumers
* "Easier to open" - reported by 34% of consumers (unexpected positive outcome)
* "Appears less premium" - concern from 13% of consumers, primarily in premium dairy product lines

**Financial Analysis**

**Implementation Costs**

| **Category** | **Cost ($)** | **Notes** |
| --- | --- | --- |
| Engineering Development | 825,000 | Including material testing and design iterations |
| Tooling Modifications | 1,240,000 | For all 7 production lines |
| Production Downtime | 398,000 | During implementation |
| Marketing & Communication | 175,000 | Internal and consumer communication |
| **Total Investment** | **2,638,000** |  |

**Annual Savings**

| **Category** | **Savings ($)** | **Notes** |
| --- | --- | --- |
| Material Cost Reduction | 2,870,000 | Based on current resin prices |
| Transportation Savings | 340,000 | Due to reduced weight |
| Carbon Credit Value | 105,000 | Under current carbon pricing |
| **Total Annual Savings** | **3,315,000** |  |

**ROI Calculation**: 10-month payback period, 126% ROI over 3 years

**Challenges Encountered**

1. **Production Adaptation**:
   * Initial difficulty maintaining cycle times
   * Increased sensitivity to temperature variations
   * Staff required additional training on quality inspection
2. **Quality Control**:
   * Developed new testing protocols for thinner materials
   * Implemented advanced vision systems to detect defects
   * Established new qualitative assessment standards
3. **Supply Chain**:
   * Sourcing consistent rPET quality required qualifying new suppliers
   * Initial delivery delays during supplier ramp-up
   * Higher than expected price volatility in recycled content

**Lessons Learned**

1. **Technical Development**:
   * Finite element analysis models required calibration for thinner materials
   * Small-scale tests did not fully predict production challenges
   * Material variability had greater impact than anticipated
2. **Implementation**:
   * Staged rollout by production line was more effective than parallel implementation
   * Operator training was as critical as engineering specifications
   * Cross-functional teams improved problem-solving during implementation
3. **Market Introduction**:
   * Soft launch with minimal marketing proved effective for gathering feedback
   * Consumer education about environmental benefits increased acceptance
   * Retail partner engagement was crucial for successful implementation

**Recommendations for Future Projects**

1. **Expand Implementation**: Roll out lightweight containers to remaining product lines with priority to high-volume SKUs.
2. **Further Development**: Investigate additional 5-8% weight reduction potential through advanced polymer blends currently in R&D testing.
3. **Strategic Partnerships**: Expand collaboration with material suppliers to develop next-generation sustainable materials with improved performance/weight ratio.
4. **Consumer Messaging**: Develop more prominent sustainability messaging to capitalize on environmental benefits as a product differentiator.
5. **Production Excellence**: Document best practices and create standardized implementation playbook for future production lines and facilities.

**Next Steps**

| **Action** | **Responsible Team** | **Timeline** |
| --- | --- | --- |
| Complete implementation on remaining production lines | Engineering & Operations | Q2-Q3 2024 |
| Develop consumer-facing sustainability communication | Marketing & Sustainability | Q2 2024 |
| Initiate next-generation material development | R&D & Procurement | Q3 2024 |
| Document standards and training materials | Technical Documentation & Training | Q2 2024 |
| Begin international adaptation assessment | Global Operations | Q4 2024 |

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