



# Gravure Summit

## Transforming Gravure

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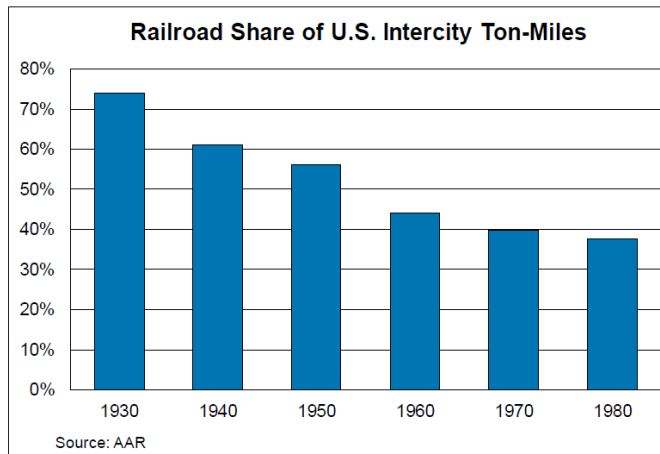
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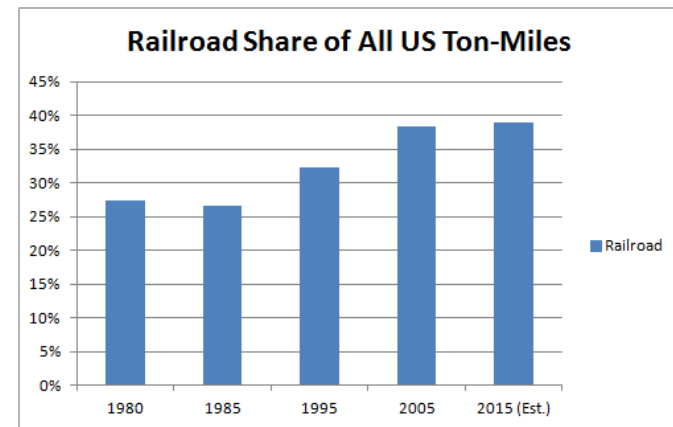




# The Question



Source: AAR, May 2015, A Short History of US Freight Railroads



SOURCE: U.S. Department of Transportation, Research & Innovative Technology Administration, Bureau of Transportation Statistics.

- After losing market share for more than 50 years, the North American Railroad industry transformed itself and increased its share by 13%.
- **The Question: Can the North American Gravure Industry transform itself, reignite growth, and reverse a 50 year decline in market share?**



## Action Research - Phases

- ➔ ■ Phase I: “Is there an opportunity to transform gravure?”
- Phase II: “Can the opportunity withstand in-depth analysis and become a grounded business case?”
- Phase III: “Can the required technologies be de-risked and industrialized?”
- Phase IV: “Does the industry have the will to reinvent itself and transform its future?”



# Phase I Results

- There is an opportunity to transform gravure.
- The opportunity is restricted to Packaging Gravure.
- In Packaging, gravure has several advantages. One stands out as a growth opportunity: using specialty inks to create differentiated shelf appearance.



Thermochromic Inks



Tactile Inks



Lustrous Metallics



Opaque White Gradients



Smooth, Opaque Whites





## Phase I Results (continued)

- Gravure's addressable market is limited by a large cost gap:
  - Trade shop gravure cylinders: reimagining cost is \$0.30 - \$0.60 per in<sup>2</sup> (\$0.45/in<sup>2</sup> avg).
  - Trade shop flexo plates (mounted): ~\$0.25-27/in<sup>2</sup> (purchase price).
  - In-house flexo plates (mounted): ~\$0.19-20/in<sup>2</sup> (cost only, shared resources, different accounting practices).
- The Opportunity: Expand gravure's addressable market by (1) reducing the cost gap and (2) selling its value (3) in market segments where it is currently too expensive to compete.



## Phase II Approach

- Growth: How could value creation and cost reduction be combined to reignite growth in packaging gravure? Is such a combination feasible?
  - Value Creation:
    - Which markets have the greatest potential to adopt premium gravure printed products?
    - What can brand owners reasonably afford to pay for such products?
    -  ▪ How big is gravure's performance advantage, and how sustainable is this advantage?
  - Cost Reduction:
    -  ▪ To what extent could the cost of producing gravure printed products be reduced by introducing of new technologies and operating practices?



## Phase II – Value Creation

### ■ Preliminary Results

- There are chemical and physical reasons to believe that gravure's advantage in delivering specialty inks is real and sustainable.
- To assess the value of gravure's advantage, we will have to present converter marketing executives with flexo-vs-gravure samples.



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## Phase II – Investigating Cost Reduction

- Approach: Model “To Be” Cases
  - Wide web flexible packaging environment.
  - New technologies: Chromeless, resizable cylinders.
  - New operating practices:
    - In-plant engraving with in-plant cost conventions.
    - Cylinders are re-imaged without customer approval.
    - Cylinder proofing is eliminated.
    - Stepped repeat lengths (future case)
  - Starting point:
    - Exact repeat.
    - In-plant cylinder prep and engraving (full in-plant).



Closing The Cost Gap





## Phase II – Cost Reduction

- Preliminary Results
  - **On a level playing field (enabled by new technologies), the cost of in-house cylinder prep and engraving is so close to the cost of in-house flexo plate making (\$0.19 - \$0.20 per in<sup>2</sup>) that the difference does not matter.**
  
- Understanding This Surprising Outcome
  - Why it makes sense.
  - Savings from in-plant economics.
  - Technical barriers to implementation.



## Why The Result Makes Sense

In-Plant Economics – Flexo Plates vs Gravure Cylinders				
Cost Element	Flexo Plate Cost (Mounted)		Gravure Cylinder Cost	
	Cost (\$/sq in)	Comments	Cost (\$/sq in)	Comments
Image Carrier	\$0.10	Photopolymer Plate	\$0.02	100 $\mu$ Ni, Applied Cost
Other Variable	\$0.02	Energy, Wash, Sticky Back	\$0.02	Energy, Tools, Resizing
Depreciation	\$0.01	\$1.5M	\$0.045	\$4.0M
Space	\$0.002	1500 sq ft	\$0.005	5000 sq ft (x inventory)
Labor	\$0.03	2-Shifts	\$0.06	2-shifts
Overhead	\$0.03	Incremental Overhead	\$0.04	Incremental Overhead
<b>Total</b>	<b>\$0.19 - \$0.20</b>		<b>\$0.19 - \$0.20</b>	



# Savings From In-Plant Economics

- The sources of some in-plant cost savings are obvious:
  - Shared supervision, maintenance, and other support.
  - Cost center (versus profit center) accounting.
  - Shipping cost savings (when source-to-destination distances are large).
  
- Others are less apparent:
  - We'll use the example of an in-plant sheeting operation to demonstrate this point.

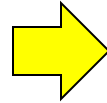


## Less Apparent Benefits



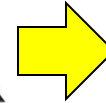
### Receiving & Raw Material Inventory

- Receives and stores uncut rolls of board



### Sheeting Department

- Cuts rolls of carton board to custom sized sheets



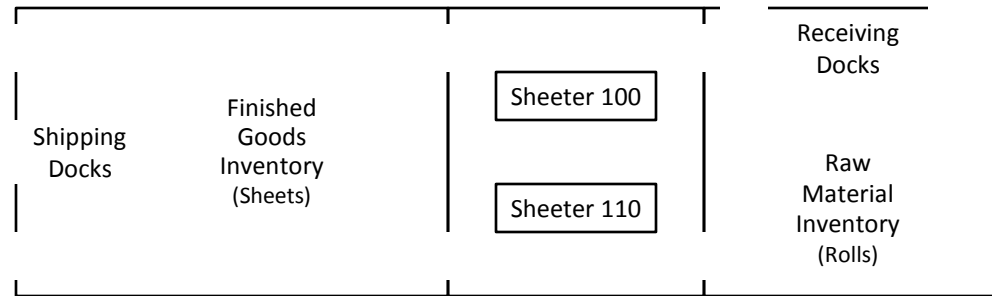
### Finished Inventory & Shipping

- Stores finished sheets by size
- Pulls completed orders from inventory
- Ships completed orders to customers.

- Additional Benefits Accrue from Simplification and Lean Operation.
- Consider the Difference between sheeting at a Paper Distributor and in a Folding Carton Plant:
  - Paper Distributor – dozens of grades, hundreds of remote customers
  - Folding Carton Plant – handful of grades, one on-site customer (the press department)



# Paper Distributor Plant

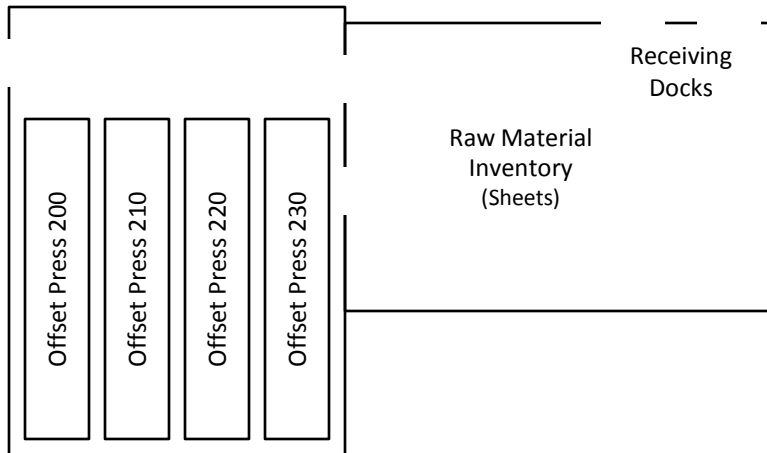


## Paper Distributor Plant

- Large roll-stock warehouse receives and stores dozens of grades. Partially used/unused rolls kept on-site.
- Sheeter schedules are constantly disrupted by customer crises. Synchronized production is a dream.
- Large inventory of customer orders (sheets); many are produced early to balance loading. Some inventory is stored for customers as a service.
- Large shipping department plans truck shipments to remote customers.
- Many shipments each day – multiple shipping docs; forklifts staffed to serve daily peaks and valleys in shipping demand.

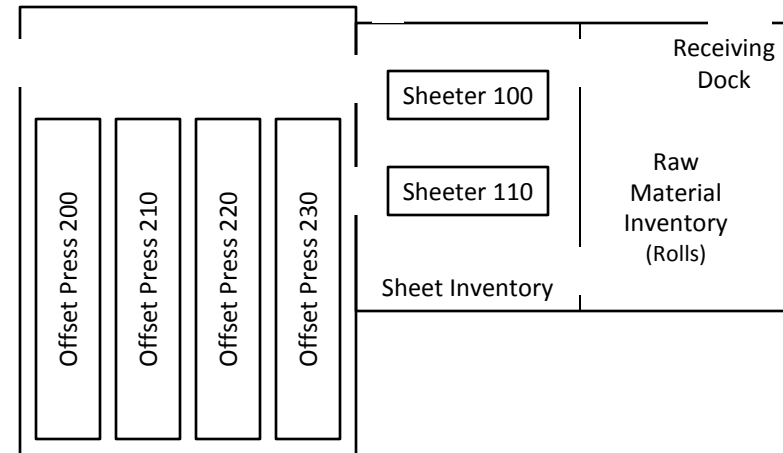


# Folding Carton Plant (Before and After)



## Folding Carton Plant – Before Sheeter Project

- Custom size sheets received (2 receiving docks)
- Custom sheets stored in rack storage
- Sheets pulled and delivered to press



## Folding Carton Plant – After Sheeter Project

- Rollstock received (1 receiving dock) & floor stacked
- 60% of old warehouse becomes the sheeter bay
- Sheeters schedules synchronized with press schedules (JIT supply with 24 hr sheet inventory)
- Sheeted product is delivered by forklift (the same forklift that previously pulled sheets from Raw Material (Sheet) Inventory.



# Technical Barriers to Implementation

- Unknowns which must be resolved prior to implementation:
  - Chromeless Cylinders: Choose a lead technology (engravable NI, or engravable polymer with a DLC coating) and complete industrialization of the process.
  - Resizable Cylinder Technology: Develop a resizing technology that is compatible with the chosen chromeless cylinder technology.
  - Printing: Develop process parameters for printing without hazing or other defects (inks, doctor blades, press settings).
- **A large, costly, but entirely feasible development program will be required to overcome these barriers.**