What Does the Future Look Like for Paper Recycling

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Gershman, Brickner & Bratton, Inc.

Sustainable Packaging Coalition
Impact 2020 Virtual
March 31, 2020

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BRADLEY KELLEY

Senior Project Engineer

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- 20 years' public & private-sector\s engineering design experience
- Design expertise in processing systems for MSW, Single-stream recycling, and C&D waste
- Experienced Project manager for biomass and WTE projects.
- Leader of multiple large-scale and statistically significant Waste Characterization Projects throughout the US.
- Concept designer of two facilities, one for single stream processing and one for C&D processing, that were presented Gold Excellence Awards by the Solid Waste Association of North America (SWANA) recognizing outstanding solid waste facilities

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Gershman, Brickner & Bratton, Inc.
Innovative, Sustainable Solutions for Solid Waste Management

GBB Vision

*A **world** where discarded materials are used as resources rather than wasted*

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Part 1: Fiber Recycling in the US

Current Trends and the Effect of National Sword

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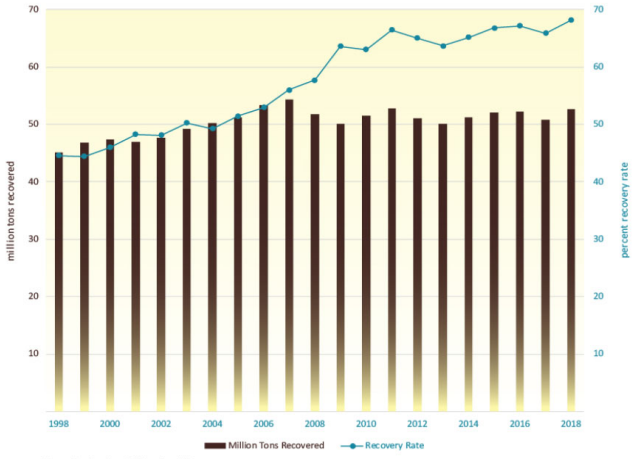
Domestic Mill Consumption of Recovered Paper (US): US Paper Recovery Rate

Source: American Forest & Paper Association

- In 2018, domestic mill processed 68.1% of recycled paper in US.
- 8% increase in US Paper Recovery Rate from 2016



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www.paperrecycles.org/statistics/paper-paperboard-recovery

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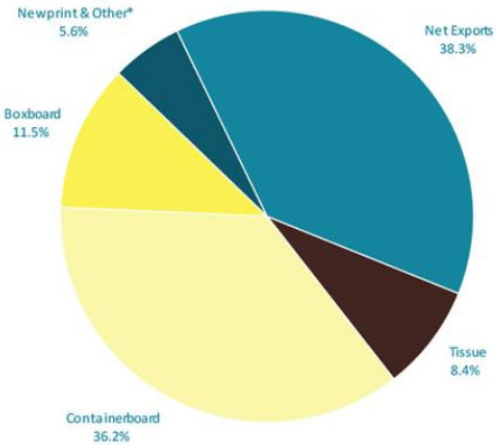
Where US Recovered Fiber is Utilized

- In 2018, 47% of recovered fiber went to Containerboard and Boxboard.



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www.paperrecycles.org/statistics/where-recovered-paper-goes

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New Recovered Fiber Projects in North America

- **24 announced projects in US and Mexico (as of March 2020)**
  - New Mills
  - Line Extensions/ Facility Expansions/ Facility Conversions
- **Types of feedstock**
  - OCC
  - Mixed Paper
  - Sorted office paper
  - Newsprint
- **The total new capacity from announced potential projects (as reflected in research) amounts to :**
  - "3.5 million tons of New OCC and mixed paper consuming capacity"
  - "1 million tons New Recycled Pulp"

Source: NERC,2020

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resource-recycling.com/recycling/2019/08/27/these-projects-are-boosting-domestic-capacity-for-recycled-paper/

nerc.org/documents/Summary%20of%20Announced%20Increased%20Capacity%20to%20Use%20Recycled%20Paper%20%E2%80%93%20Updated%20March%202020.pdf

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New Recovered Fiber Projects in North America (Data from Resource Recovery)

- 18 announced projects in US and Mexico (as of December 2019)
  - 5 New Mills
  - 13 Line Extensions/ Facility Expansions/ Facility Conversions
- Types of feedstock
  - OCC
  - Mixed Paper
  - Sorted office paper
  - Newsprint
- The total new capacity from announced New mill projects:

  - Approx. 2 million Tons recycled fiber capacity

Map courtesy of Resource Recycling Magazine

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resource-recycling.com/recycling/2019/08/27/these-projects-are-boosting-domestic-capacity-for-recycled-paper/

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New Recovered Fiber Projects Examples: Nine Dragons Company (ND Paper)

- Hong Kong based, Bermuda listed, recycled paper packaging company
- **14 million tons per year** of capacity in China and Vietnam
- ND Paper plans to increase pulp production capacity to **1.61 million metric tons per year** by **2021.** Most of that increase will come from recycled pulp produced at the company's U.S. mills.
- The Company plans to expand capacity at **three (3) US recovered paperboard mills.**

ND Paper- Biron, Wis. mill

- **Feedstock**: OCC/mixed paper
- **Project Description**: 240,000 metric tons of recycled pulp capacity by 2020.

ND Paper- Fairmont, W.Va. mill

- **Feedstock:** OCC/mixed paper
- **Project Description:** 60,000 metric tons of recycled pulp capacity by 2020 ; additional 60,000 metric tons by 2021.

ND Paper- Rumford, Maine mill

- **Feedstock**: OCC/mixed paper
- **Project Description:** 200,000 metric tons of recycled pulp capacity by 2020.

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resource-recycling.com/recycling/2019/12/03/signals-point-to-all-out-recycled-fiber-ban-in-china/

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New Recovered Fiber Projects Examples: Bio Pappel - McKinley

- Mexico based recycled paper company
- US presence in Arizona, Colorado, New Mexico and Texas
- Acquired Port Angeles mill in Washington in 2017.
- Shutdown for modernization, plans to added recycled paper pulping capacity.
- The facility is estimated to produce 240,000 tons per year of new capacity (180,000 containerboard, 60,000 kraft paper)

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New Recovered Fiber Projects Examples: Additional Projects

Packaging Corporation of America	**Project Description:** Company plans to install 350,000-ton-per-year recycled fiber pulp line by 2020 to increase OCC Pulping Capacity
North Pacific Paper Company (NORPAC)	**Project Description:** Company announced it would consume more than 400,000 metric tons of OCC and mixed paper combined per year.
Georgia-Pacific (GP), LLC	**Project Description:** Company installed recycling technology (Juno Technology) at GP mill to recover fibers mixed waste to make paper-based products. The project is set to process 300 TPD containerboard.
Total Fiber Recovery (TFR)	**Project Description:** Company is developing a $49 million facility that will process 300,000 tons per year of mixed paper and OCC
Graphic Packaging	**Project Description**: Company is installing a recycled paperboard system at its Kalamazoo, Mich. paper mill that will give facility the ability to process lower-quality feedstock

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nerc.org/documents/Recycled%20Paper%20Market%20Expansion%20-%20Updated%20June%2020,%202019.pdf
www.recyclingtoday.com/article/closing-an-ugly-chapter-for-occ
resource-recycling.com/recycling/2020/03/03/fiber-end-users-continue-to-evolve-with-export-markets/

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Part 2: Recycling Processing of the Future

Recovery of Fiber and Other Commodities:

- ***Conventional***
- ***Optical Sorters***
- ***Robotics***

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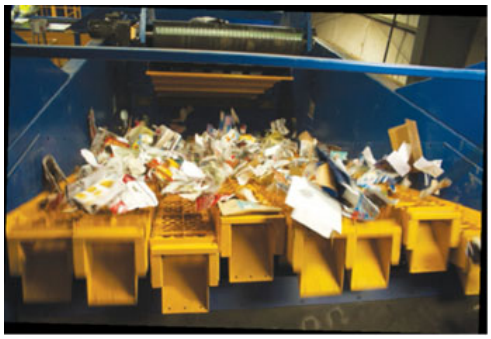
Traditional Separation: 2D/3D Separators

Ballistic Screen



Source: Machinex

Polishing Disc Screen

Source: CP

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Processing Systems of the Future

- The Future of Material Recovery Facilities (MRF): *New Processing Systems will Consist of More of the Following:*
  - **Combined Systems**
    - Systems will be capable of processing more than one type of stream, with some equipment processing multiple streams
  - **More Optical Units, less Screens**
    - Optical units will be utilized to recover more materials including fiber
    - Streams need only be divided by size/density prior to optical units (instead of by shape)
  - **Robotic Sorters**
    - Both for QC and for Pre-Sort – can positively pic multiple materials

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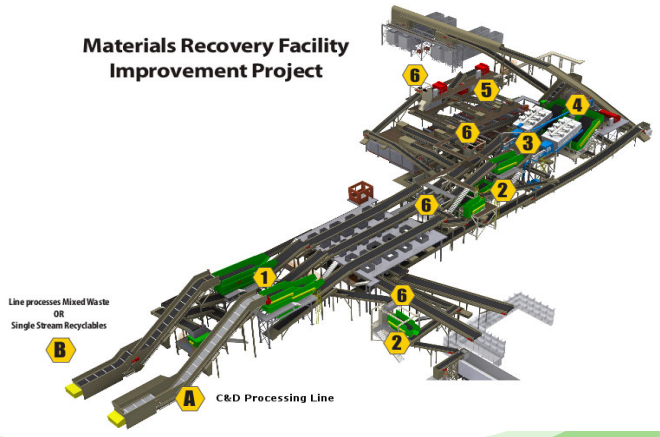
Processing Systems of the Future

Combined Systems

Source: MRWMD/BHS – Monterey, CA



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Optical Units

If you can see it, you can collect it....

Source: CP Group / BHS

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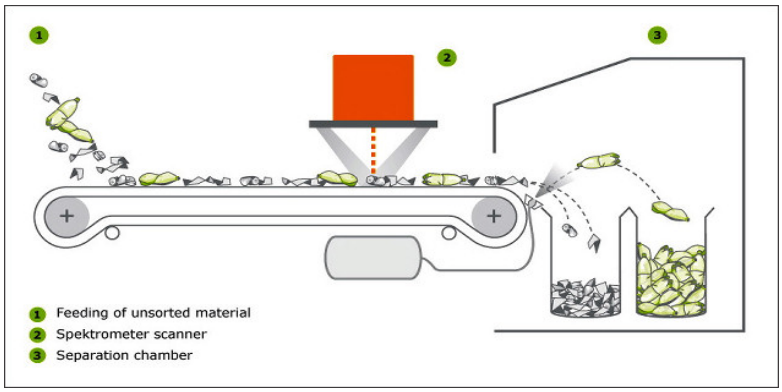
Optical Units



Source: TiTech/Tomra

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Smart Technologies for MRFs

Improved Optical Units

- With improvements in algorithms, shape recognition and attention to air flow characteristics, optical units can now better recover:
  - **Types of Fiber**
  - **Clean Wood**
  - **Film**
  - **Flexible Packaging**
  - **Cartons**
  - **Other potential target materials (i.e. Black Plastics)**

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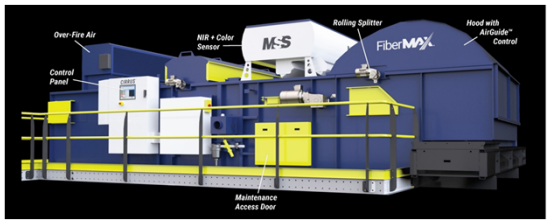
Smart Technologies for MRFs

CP Groups CIRRUS® FiberMax™



- Utilizes air flow to keep light-weight items from flying off the belt and improve trajectory
- Positive eject on plastics, other materials

Source: CP Group

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Smart Technologies for MRFs

Video of CIRRUS® FiberMax™

www.mssoptical.com/cirrus-maxselect/fibermax//

Source: CP Group

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Smart Technologies for MRFs

Other Optical Advancements – Additional Spectrum and Lasers

Steinert Unisort Black

Source: Steinert

Tomra LOD

Source: Tomra

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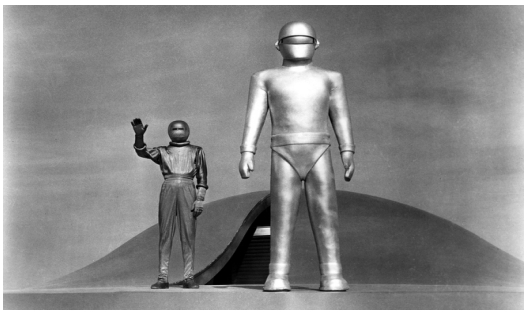
Processing Systems of the Future

The Rise of the Robots



Source: "The Day the Earth Stood Still" 1951

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Smart Technologies for MRFs

Robot Sorters SamurAI™ and Max-AI®

Source: Machinex / BHS

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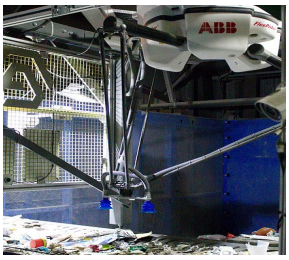
Smart Technologies for MRFs

Robotic Sorters



AMP Cortex

RoBB-AQC

Source: AMP / Van Dyk

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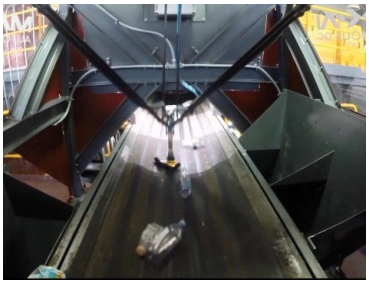
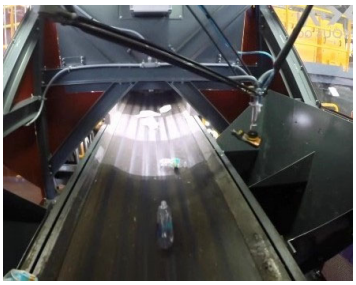
Smart Technologies for MRFs

Video of QC Robotic Sorter – Max AI®





www.max-ai.com

Source: BHS

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Smart Technologies for MRFs

QC Robotic Sorters – Advantages and Disadvantages

- **Advantages**
  - Better Speed and Accuracy (*for most items*) than Manual QC *(Most will achieve 98% purity (or more) after an optical unit for PET or HDPE)*
  - No Pee Breaks!
  - Decent ROI
- **Disadvantages**
  - Expensive (not right for all situations)
  - New, difficult to know lifespan and maintenance needs
  - Still susceptible to items that aren't "seen"
  - Limited belt sizes and throughput (for now)
  - Don't believe all the hype....

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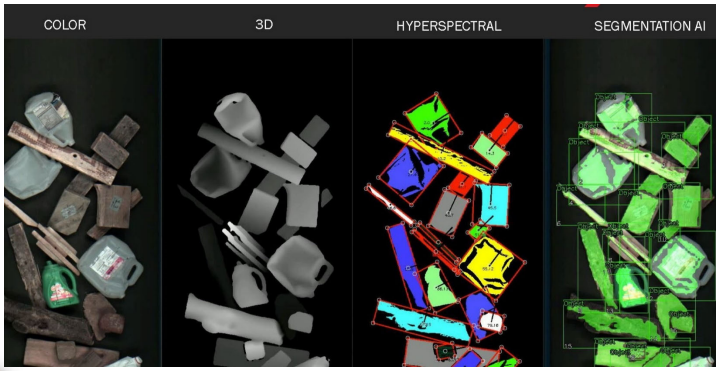
Smart Technologies for MRFs

Robotic Sensors with AI

Source: Waste Robotics



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Processing Conclusions

The lines between processing Single Stream, MSW and C&D will become blurred

- Systems will be capable of processing multiple material streams
- Opticals and robotics will be able to easily target multiple materials not traditionally recovered
- AI and sensors will increase the knowledge regarding what is in both inputs and outputs from processing systems
- The very nature of the processing systems will create new commodity streams that without a market will become residue
- The processing facilities will need to be part of a larger recovery system to be successful (SBP or MMC's)

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Additional Info

Technology and Equipment Guide

Supplemental Report: *The Evolution of Mixed Waste Processing Facilities* – Technology and Equipment Guide (2015)

- Prepared for the American Chemistry Council
- https://plastics.americanchemistry.com/Education-Resources/Publications/The-Evolution-of-Mixed-Waste-Processing-Facilities-Technology-and-Equipment-Guide.pdf

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Thank you! Questions?

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