NEW VS. OLD MILLS – ASSESSMENTS OF RECYCLED PAPER PRODUCTS BETWEEN US AND CHINA
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Highlights
- China applied 63% recycled fiber in all paper products. Recycled fiber can produce quality products.
- China mills kept positive on market demands and facility investments.
- Newsprint and paperboard containing recycled fiber from U.S. & China mills are investigated, strength and weakness seen on both sides.
- Recycled fiber applied in U.S. mills has better quality than those in China peers.
- U.S. is good on paper recycling, but weak on recycled fiber utilization.

Introduction
The Facts of Pulp and Paper between U.S. and China
- China becomes the largest paper/board manufacturer, both capacity and productivity are still increasing.
- U.S. paper/board capacity and productivity were keeping shrinking since late 1990’s.
- Chinese has extremely low natural resources in terms of per capita.
- Paper recycling is the most successful sustainable program in U.S.
- U.S. has advantages in manufacturing experiences and techniques, and China has advantages in new facilities and processes.

Attitudes on Recycled Fiber Utilization
- Recycled fiber is the largest fiber source in China, up to 63%. U.S. only applied 37% recycled fiber into new paper products.
- China applied recycled paper in all grades of products, U.S. only focus on board/pulp, tissue, newsprint.
- U.S. exports 42% of recycled paper in 2011, and is the largest recycled fiber supplier to China.

Methodology
Samples Sources
- Newsprint paper (NP) and one-side-coated paperboard (PB) samples were coming from four mills in U.S. and China.
- Grammage (g/m²): 45/48 gsm, 48 gsm, 250/350 gsm, 350 gsm.
- Recycle %: 100%, 100%.

Tested Paper Properties
- Fiber quality, ash content and hot water extract pH & conductivity
- Paper mechanical and surface properties
- Optical properties and lightfastness

Standards
- TAPPI

Results and Discussions
Fiber Analysis
- Recycled fibers (tinted) were found under 50X microscope.

Specimens | CNP | UNP | CPB | UPB
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Fiber length (weighted, mm) | 1.12 | 1.56 | 94 | 1.68
Fiber width (mean, micron) | 21.3 | 29.13 | 17.73 | 22.97
Curl index (Arithmetic) | 0.10 | 0.05 | 0.09 | 0.09
Kink index (1/mm) | 1.66 | 0.53 | 1.59 | 1.34
Zero span tensile (corrected, N/cm) | 26.3 | 26.9 | 23.8 | 20.9

Fiber quality assessment
All fibers are short and straight.
Fibers from U.S. mills are longer and wider, indicates Chinese mills use lower grade fiber.
Zero span tensile indicates the China uses additional binders to offset fiber weakness.

Optical Properties and Lightfastness
- All newspapers have closed optical properties, e.g. brightness, gloss and CIE L*, a*, UNP shows yellowish tint.
- CPB has lower opacity than UNP.
- No Fluorescence is found in all of samples.
- UNP has poor lightfastness, which indicates high lignin content. Virgin pulp is included.

Conclusion
- Recycled fiber is the main fiber source of China pulp and paper industry.
- China mills apply 100%, relative low grade recycled fiber produce quality paper products.
- U.S. has very good paper recycling program, but need to invest on recycled paper utilization.
- U.S. mills need to find solutions to overcome current facility shortage, especial for recycled paper.