Lateral Corrugator: 
An Improved Method of Manufacturing Corrugated Boxes

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Industry Partners: 13 contributors of capital, equipment and expertise
Technology Description

- Conventional corrugating does not utilize the strength advantage of machine direction fiber alignment. Compression strength enhancement by orienting the linerboard transversely can be 30% or more.

**Project Goal:** Develop a commercially viable lateral corrugating process including designing and building a pilot lateral corrugator, testing and evaluating the pilot machine, and developing a strategy for commercialization.
Energy Savings

- 38% of boxes, nearly all A-flute and half of C-flute, have stacking strength requirements.
- 11 million tons/yr of combined-board in US market
- Commercialization would begin immediately upon project completion and the technology would start to impact the market within one year after.
- 15% reduction in weight; 1.6 million tons fiber and 42 trillion BTU’s per year; plus reduced energy use in box making.
- Overall energy savings impact on the market includes box plant trim waste reduction, transportation savings due to increased efficiency and reduced weight, and paper machines fully trimming-out.
Other Benefits

- Lateral corrugating is a cut-to-width operation resulting in considerable benefits at the box plant and paper mill:
  - Waste reduction (bp)
  - Trim optimization (bp & pm)
  - Ability to utilize paper machine trim rolls (pm)
  - Reduced inventory (bp)
  - Shipping optimization (pm to bp)
Project Strategy

- The key technical barrier for this project is the ability to design and build a sheet feeding system that can produce viable linerboard splices at reasonable machine speeds.
- The present project barrier is the ability to design and build single-facer and double-backer glue machines for the pilot lateral corrugator.
Overcoming Key Technical Barrier

- Existing corrugating technology implemented.
- Existing sheet feeding technology to be utilized.
- Lateral corrugator has been designed as retrofit.
- Great flexibility of configuration designed in.
Glue Machines

- Machine Designer
  - Bill Nikkel, retired

- Cooperating Companies:
  - Harper/Love Adhesives Corp.; Jim Carbone
  - Pamarco
  - Harper Machinery
  - Chicago Electric
  - Arc International

- Schedule
  - Drawings approved: Sept 30, 2005
  - Glue and metering rolls: tbd
  - Variable speed drives: tbd
  - Machining and assembly: tbd
Milestones and Decision Points

- Jun ‘04 - Evaluate heat transfer properties and conduct splicer and seam analysis
- Sep ‘04 - Address economic and production considerations
- Dec ‘04 - Identify commercialization partners (ongoing)
- July ‘05 - Complete lateral corrugator design
- Dec ‘05 - Build and install lateral corrugator roll stack
- Jan ‘06 - Build and install lateral corrugator hydraulic and drive systems
- Mar ‘06 - Build and install lateral corrugator glue machines
- Apr ‘06 - Demonstrate lateral corrugator roll stack configuration (Go/No-Go Decision Point)
- May ‘06 - Complete sheet feeder and splicer design
- Nov ‘06 - Complete fabrication and integrate feeder and splicer into test stand
- Dec ‘06 - Final evaluation: conventional vs. lateral corrugator
Lateral Corrugator Drive System

Lateral Corrugator Roll Stack
Commercialization Potential

- Initially seen as a technology to reduce fiber usage and, thereby, energy consumption and cost, the greatest immediate commercial advantage lies in waste minimization, transportation optimization, and mill trim reduction.

- Designed as a retrofit and not requiring full market penetration have increased the potential for success.

- The greatest technical barrier to implementing the technology is the ability to produce viable splices at acceptable machine speeds.
Commercialization Plan

- The initial commercial installation is planned for a facility producing bulk boxes.
- The advantage of bulk container manufacturing, since utilizing heavier weight papers, is that machine speeds are typically slower.
- There are also advantages due to seam placement and the disproportionately greater strength enhancement of lateral corrugating at higher basis weights.
- CrosCorr, Steve Baughman, Kentucky location proposed
Project Partners

- **Financial Support:**
  - Temple-Inland Paperboard and Packaging
  - Smurfit-Stone Container Corp.

- **Equipment and Expertise:**
  - Corrugated Gear
  - Harper-Love Adhesives
  - Albany International
  - Container Graphics Corp.
  - Johnson Corporation
  - WIKI Instrument Corp.
  - MarquipWardUnited
  - Hardy Instrumentation
  - Corn Products
  - CUE
  - Armstrong
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- Acknowledgements
  - 13 Project Partners
    - DOE
    - Robert Hall
    - Mark Szlemko
  - IPST@GT
    - Perry Arrington
    - Mark Urbin