Day 1 Monday, April 15
8:00 – 8:30
Welcome, Introductions, Learning Objectives

8:30 – 12:00
The Corrugating Process (overview of equipment/operations & focus on how to improve bonding between the liner and medium)

- Double-Wall Corrugator Wet End Summary J. Porter
  Identify main components of a Corrugated Web:
  Liner, Medium, Adhesive

- Lay-out of Equipment (Numbering/Stations)
  Single-facer #1
  Double-face
  Double-facer Liner Splicer (position 1)
  Double-facer Liner rollstand (position 1)
  Triple pre-heater
    a. Function
    b. Wrap-arms

  Glue Unit
    a. Function
    b. Additional preheaters

- Corrugator Terms and Variables
  Corrugated Board
    Single Face
    Single Wall
    Double Wall
    Triple Wall
  Paper Grades
    Basis Weight
    Standard weights
  Construction of Box
    Box Blank
  Paper Characteristics
    Liners (Two sides), Medium
    Moisture, Basis Weight

- Optimizing Bonding in the Corrugator
  Application step
  Wetting and Penetration step
  Gelatinization & Green Bond steps
  Evaporative Bond - Wetting/Penetration (DF) step
  Gelling & Green Bond for Pressure Bond (DF) steps
  Drying/Fully Curing step
• Liner & Medium Properties Affecting Corrugating

12:00 – 1:00 LUNCH

1:00 – 4:00
**Linerboard & Medium Performance Properties & Tests** M. Kocurek
What happens to the Linerboard & Medium in the Corrugating process
Sheet Structure & why it’s important, MD/CD Fiber Orientation, Formation
Properties & Tests, what they are telling us, and what contributes to their values:
Stiffness, Ring Crush, Mullen, Concora
Edgewise Compression Test, STFI
Tensile, Modulus, Stretch
Liquid Absorption, Porosity, Adhesion
Sizing tests, Cobb, Water drop, etc.
Moisture & Humidity Effects on Performance Properties
Causes of Curl, Warp, & Wash Boarding
Viscoelastic Creep Failure of Boxes
Runnability on the Corrugator
Others, as per survey of participants

4:00 – 5:00 **Review of How Liner & Medium Properties Affect Corrugating** J. Porter, M. Kocurek

5:30 **Adjournment**

Day 2 Tuesday, April 16
Pulp & Paper Mill Operations M. Kocurek
8:00 – 8:40
**Fiber Raw Materials, Pulp Mill, Recycling**
* Fiber Properties & Effects on Sheet Structure
* Pulping Processes for Liner & Medium
* Recycled Fiber Processing, Problems, Improvement

8:50 – 9:30
**Stock Prep Refining**
• Refining mechanism & variables; effects on sheet and properties
• Improving Refining for Linerboard & Medium
• Plate pattern, intensity, other variables; Case study

9:40 – 11:20
**Chemical Additives & Effects**
• pH control, Alum, Sizing Chemicals, Fillers, Strength Adhesives
• Formation Aids, Retention
• Wet End Chemistry

11:30 – 12:00
**Paper Machine Approach system**
• BW control, White water, Cleaning, Screening, effects of Air
12:00 – 12:45  LUNCH

12:45 – 3:00

**Paper Machine Wet End Operations**
- Headbox & Sheet Forming operations
  - Pressure/Hydraulic Headbox operations
  - Importance of and Variables affecting Formation
  - Microturbulence Strategies
  - Jet/Wire Velocity Strategies
  - Fiber MD/CD orientation strategies, TSI / TSO Analysis
  - Crossflows & BW profile control
  - Forming fabrics
- Top Sheet Forming; Secondary Headboxes, Top Fourdrinier;
- Hybrid Formers, Twin Wire Gap Formers

3:00 – 5:00

**Pressing, Drying, Calendering, Winding**
- Pressing Mechanism of Water Removal; Effect on Sheet Properties
- Shoe Pressing & other developments
- Effects of Drying and Shrinkage & Moisture profile on Liner & Medium sheet & properties
- Variables affecting pick up in Size Press
- Types of calenders & variables affecting calendering
- Calender box surface treatments
- Winding operations

5:00  Course Evaluation & Adjournment