INTRODUCTION TO PULP & PAPER TECHNOLOGY
LEARNING OUTCOMES

OVERALL COURSE LEARNING OBJECTIVES

The overall course objective is to give participants increased confidence in understanding the pulp & paper processes; to interact more knowledgeably with process engineers and operators; and increase their ability to contribute to improving mill operations by

1. Gaining a comprehensive overview of pulp & paper industry, mill operations, products, process variables, equipment, and terminology.

2. Increasing knowledge of how one part of the mill affects another, and to increase awareness of the importance of thinking on a mill wide basis.

3. Increasing knowledge of how the P&P processes affect product properties, in order to improve product quality and troubleshoot variations in quality.

4. Increasing awareness of the complex environmental challenges associated with pulp and paper manufacturing.

In order to achieve these overall learning objectives, there are learning outcomes associated with each key topic:

OVERVIEW OF INDUSTRY

1. To increase awareness of the factors that drive industry trends, and to review industry statistics about the major grades of paper and board .

2. To increase awareness of industry information sources.

WOOD & FIBER RAW MATERIALS

1. To learn about wood and fiber sources.

2. To increase knowledge about the major differences between Hardwoods and Softwoods, and important wood & fiber properties that affect paper properties.

PREPARATION OF WOOD & CHIPS FOR PULPING

1. Describe Woodyard operations including debarking, chipping, screening, storage, and recovery.

OVERVIEW OF PULPING

1. Increase general .knowledge of the primary categories of pulping, including chemicals, and cooking conditions.

2. Become familiar with general pulping terminology.

3. Increase overview knowledge of the most common pulp properties and tests.

KRAFT PULPING

1. To become familiar with the major types of equipment used in Pulping.

2. To gain an overview picture of the primary operations and reactions occuring in the digesters between wood and the pulping chemicals.

3. To be able to list several major pulping variables.

4. To gain an overview of some major kraft pulping trends.

MECHANICAL AND SEMICHEMICAL PULPING

1. To gain an overview of the primary mechanical pulping processes.

2. To increase knowledge about the differences in mechanical vs. chemical and hybrid pulp properties

PULP PROCESSING

1. To gain an overview knowledge of the different operations in Fiber Line pulp processing, including Fiberizing,Washing, Screening, and Cleaning, prior to the high density (HD) chest that separates the pulp mill and paper mill.

2. To get an overview of major equipment types and key operating variables.

BLEACHING

1. To gain an overview of bleaching trends, equipment, chemicals bleaching reactions, and a general list of process variables for the major bleaching sequences.

RECYCLING

1. To increase knowledge about the categories of recycled paper and board.

2. To increase awareness of the many types of contaminants assocated with recycled paper, and the problems they cause.

3. To get an overview of the different operations and equipment involved with comtaminant removal.

CHEMICAL RECOVERY

1. To get an overview of the major recovery operations, including Evaporation, Combustion, and Recausticizing.

2. To increase knowledge about the composition and properties of black liquor and what happens in the evaporators and recovery units.

3. To increase understanding of how pulping liquor is regenerated in recausticizing; and to get an overview of lime kiln operations

INTRODUCTION TO PAPER GRADES AND PROPERTIES

1. To increase understanding of important paper and board properties and tests, including, strength, optical, & printing properties,

PAPER MILL STOCK PREPARATION

1. To learn about the Refining Process, primary effects on fibers; and the effects of refining on paper machine operations and paper properties.

2. To gain an overview of the primary Additives used in paper, including strength adhesives, pigments, sizing, and retention aids. A very brief look at foam and deposit control is included.

PAPER MACHINE WET END OPERATIONS

1. To learn about the stock approach system operations prior to the paper machine.

2. To increase understanding about the two main types of Headboxes used in papermaking, and their internal operations to produce a uniform jet of stock to the wet end.

3. To visualize the sheet forming process, slice operations, fiber orientation, formation, microturbulence, dewatering, and sheet structure variations.

4. To increase awareness about the differences in sheet forming operations, and paper properties between Fourdriniers, Twin Wire Gap and Hybrid formers, and multiply board machines.

5. To gain an overview examination of Forming Fabrics.

PRESSING

1. To gain an overview of the different types of press section configurations, and what happens in a press nip.

2. To visualize what happens to the sheet during pressing.

3. To examine several pressing variables and trends.

DRYING

1. To gain an overview of drying operations, including dryer can internal operations with steam and condensate, major water removal rate differences, and major equipment & operating variables that affect rate of drying.

2. To increase understanding of how drying and sheet shrinkage affect paper and board properties; and the role of felts, draw, and sheet restraint.

3. To get an overview of Tissue Machine Yankee Drying and Creping Operations.

CALENDERING & WINDING

1. To increase understanding of the different types of calenders.

2. To examine what happens to sheet properties, by examining the major calendering variables.

3. To briefly describe Winding and roll finishing operations.

SURFACE TREATMENTS

1. To increase awareness of the on machine size press operations,

including equipment types, and the variables that affect starch pick up in the size press.

2. To increase awareness of the primary components in a Coating, including pigments, adhesives, and additives.

3. To increase awareness of the differences between Roll, Air Knife, and Blade Coaters.

4. To describe the drying of coating, equipment and mechanism.

EFFLUENT TREATMENT

1. Throughout the course, air and effluent emissions and control were discussed as part of each process operation. This final topic gives an overview of what happens in primary and secondary effluent treatment.