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Sault College of Applied Arts & Technology
Sault S(e Marie, Ontario

Course Outline

Course Title: Washing and Screening

Code Number : PPE 210 **Semester : 3**

Program : Pulp and Paper Engineering Technology

1) Philosophy and Goals :

This course on the washing and screening processes is applicable to all forms of pulping and bleaching where some material must be washed *from* the pulp fibres either **a** solid material (screening) or a dissolved material (washing). This course covers the science, technology and theory of operation of the various types of screens and washers. Topics covered include coarse and fine screening, screening terminology, material balances, screen efficiency calculations, a review of the differences in the fibres generated from mechanical and chemical pulping processes, counterciirrent washing, two types of washing (dilution/extraction and displacement), drop leg vacuum, pressure and belt washers, screw press washers, centrifugal washers, Kamyr diffusion washers, washer efficiency calculations, and Norden Efficiency.

2) Student Performance Objectives :

Upon successful completion of (his course the student will understand and be able to perform the following:

a) describe and trouble shoot the operation of the various types of coarse screens in use in both the chemical and mechanical pulping processes

b) successfully perform the calculations involved in carrying out a material balance on a coarse screening system

c) determine the screening efficiency of a screen and interpret the results as to possible problems with the screens

d) describe the theory of operation of a countercurrent washing system and perform a material balance on the washers

e) determine the washing efficiency for the washers and then interpret the results in terms of the washer operation and possible problems

0 carry out the calculations involved in determining the Norden Efficiency calculations and then interpret the results

g) differentiate between coarse and fine screening

3) Topics to be covered:

a) Coarse Screening

- Introduction: difference between mechanical pulp and chemical pulp coarse screening
- Mechanical pulping coarse screening system
  - fibre bundle removal
  - shive removal

- Chemical pulping coarse screening system - trash extractor
  - knotters
  -definition of knots
- Screening Fundamentals : - Accepts
  - Rejects
-Screen Efficiency calculations

b) Pulp Washing:

- Introduction
- Countercurrent washing
- Pulp washing fundamentals - dilution/extraction washing
  - displacement washing
- Vacuum washers : - creation of the vacuum
- Pressure washers
- Belt washers
- Wash presses
- Centrifugal washers or Fibrefuge
- Kamyr diffusion washer
-Factors affecting washing displacement efficiency
-Washer balances
-Washer performance and calculations (Norden Efficiency Factors)

c) Fine Screening :

- Introduction, purpose of fine screening
- Three types of fine screens: - Vibratory
  - Gravity centrifugal
  - Pressure screens
- Screen design parameters
- Factors affecting screen performance
- Measuring screen performance

4) Evaluation Methods :

Evaluation will be based on :

a) three (3) tests, each of equal value 25% x 3 = 75%
b) attendance, participation and assignments = 25%
Total =100%

Letter Grades will be assigned as follows :

A = 80% or more
B = 70 - 79%
C = 60 - 69%
R = 59% or less

Students having a final mark of 50 - 59% may be permitted to write a supplemental exam covering the **Entire Course,** at the instructor's discretion, provided the student has attended at least 75% of the classes.

5) Required Student Resources :

Smook, O.A. (1992), **Handbook for Pulp & Paper Technologists**
Joint Textbook Committee of the Paper Industry, Atlanta

6) Special Notes :

Students with special needs (eg. physical limitations, visual impairments, hearing *impairment,* learning disabilities, etc) *are* encouraged to discuss any required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of the students and college.