



ADecTec

Applied Decision Technologies, Inc.

Minimizing Waste Paper Mix Cost

A New Paradigm For Paper Mill Scheduling

Abstract

ADecTec provides an innovative technology designed using mathematical optimization techniques to plan paper mill operations, and to optimize finite schedules of paper machines and pulping systems. The system optimizes the two schedules in concert with each other so that the overall cost of waste paper mix and virgin pulp is minimized, and both paper quality and production due date requirements are met.

An ADecTec White Paper

May 2008

© 2008. All Rights Reserved.

Disclaimer – All numbers and examples used in this document are for illustration only and are created by ADecTec. These do not represent any customer data.

The ADecTec System

The ADecTec system is an integrated paper mill operations planning and finite scheduling system with an emphasis on minimizing the cost of waste paper mix. The system is designed to be used in real time to schedule and plan mill operations. With the ADecTec system, a mill planner can not only schedule all paper machines and pulping systems, but also optimize the waste paper and virgin pulp usage.

Waste paper costs have risen significantly over the past years. ADecTec provides tools to control waste paper usage costs without any capital expenditure.



Figure 1. Waste Paper Cost Trend

The ADecTec process generates paper machine and pulp mill finite schedules simultaneously to optimize fiber usage. This process:

- Creates a minimum-cost paper machine and pulp mill finite schedule,
- Minimizes over-production of Super High Bright pulp, and
- Maximizes usage of cheaper fibers – ground wood etc.

Optimizing Waste Paper and Virgin Pulp Usage:

Figure 1 shows that waste paper costs have increased significantly. To control costs, usage of waste paper and virgin pulp (fiber) at each step of paper making must be optimized. ADecTec technology has created a new paradigm in paper mill operations planning by scheduling paper machines and pulping systems simultaneously with an emphasis on minimizing raw material costs. Its engines optimize the complete path of fiber usage as shown in Figure 2 and ensure that waste is eliminated and the cheapest fibers are used.

The ADecTec System optimizes the complete path of waste paper and virgin pulp usage and minimizes fiber cost and wastage of fibers.

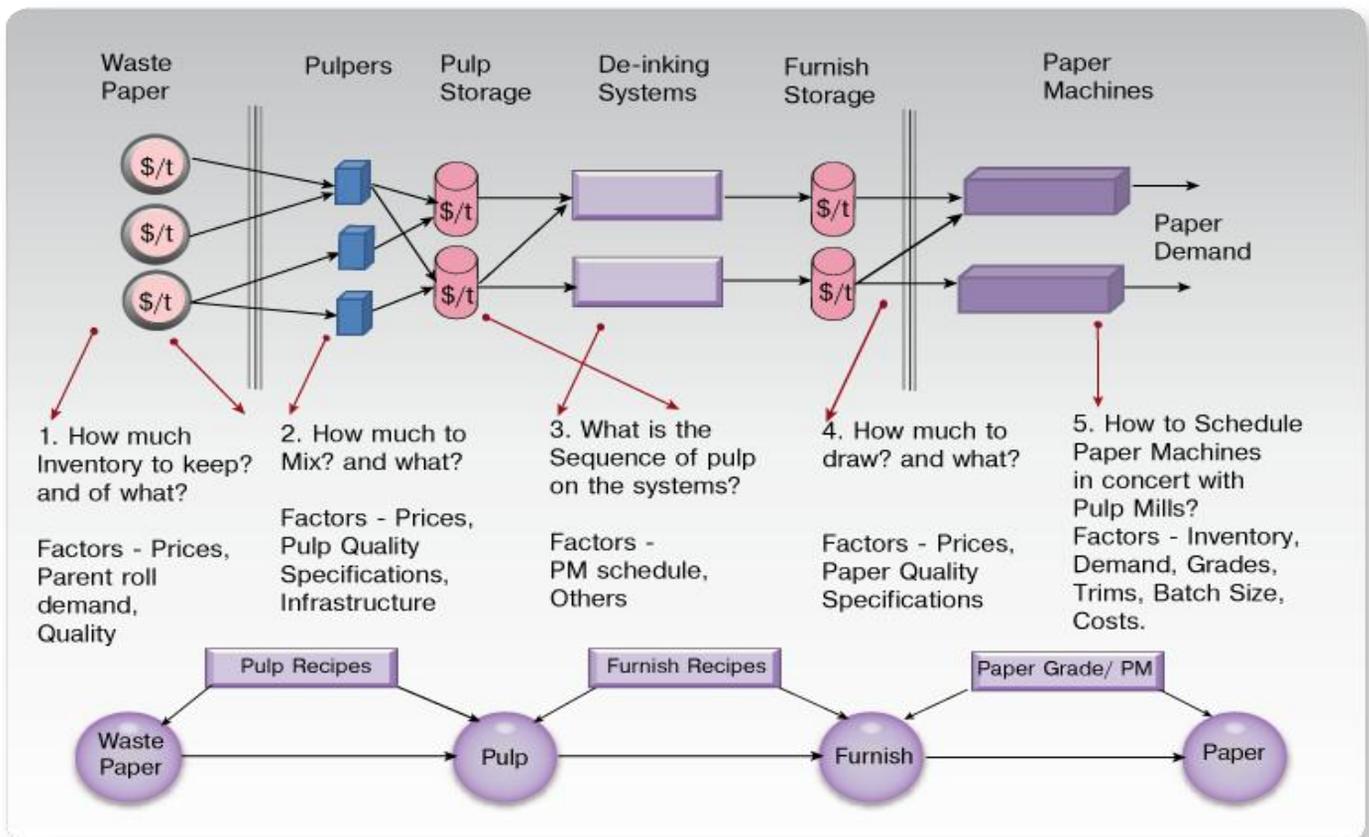


Figure 2. Waste Paper Usage Optimization in the ADecTec System

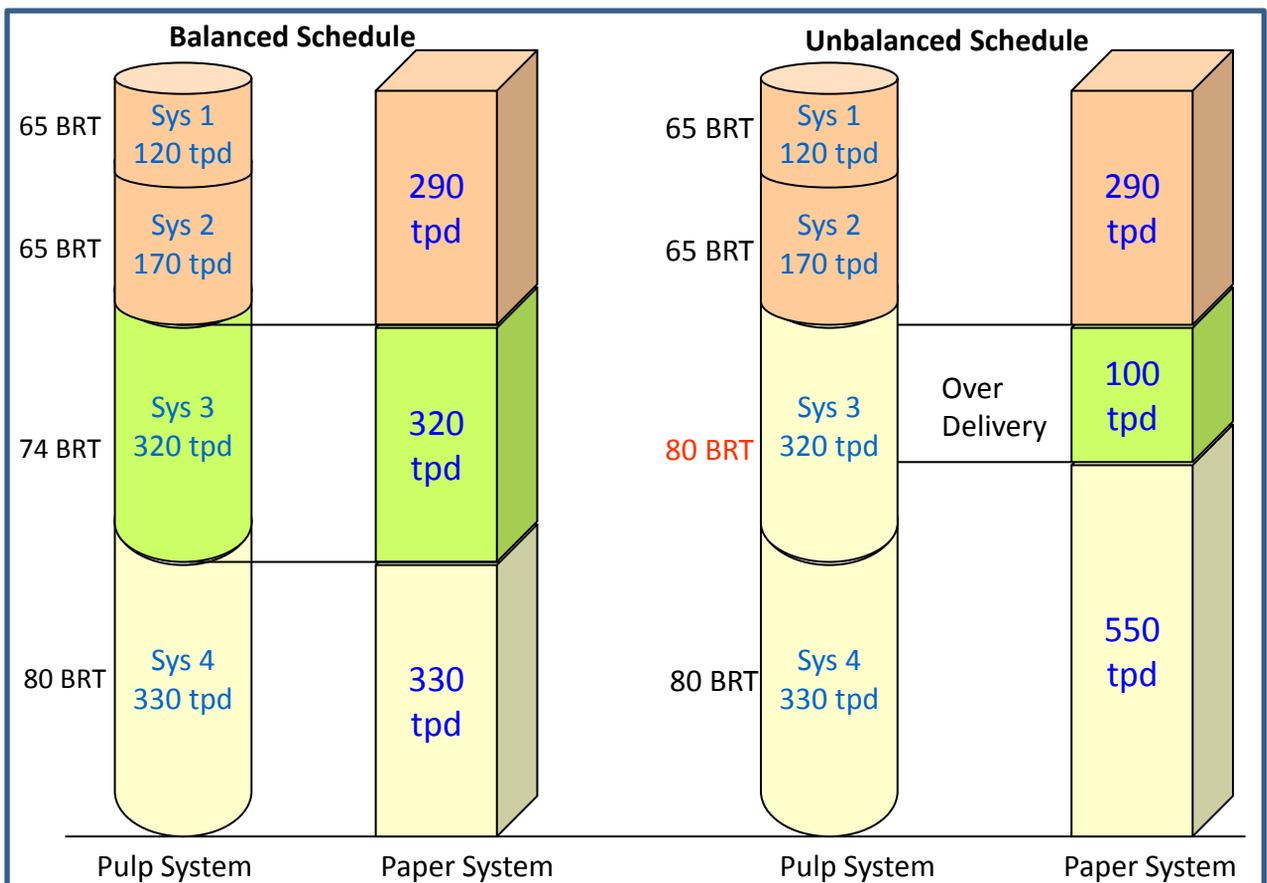
Creating a “Balanced” Schedule:

While scheduling paper machines, the ADecTec system considers the capacities and capabilities of pulping systems. In addition, while scheduling pulping systems, ADecTec considers what is being scheduled on paper machines. Therefore, paper machines are loaded in a way that ensures the correct mix of

pulp is available in the right quantities and pulp lines are scheduled to produce the right type of pulp in the right quantities at the right time. The result is a “balanced” schedule.

Figure 3 shows the difference between a balanced and an unbalanced schedule. In a balanced schedule, paper machines are scheduled such that the consumption of pulp at paper machines matches the production at pulping systems. In contrast, in an unbalanced schedule, paper machines are over scheduled (550 tpd), requiring the pulping system (Sys 3) to produce more pulp than is needed. As is shown in the example below, the excess leads to over-delivery at paper machines (80 brightness pulp for 100 tpd of 74 brightness paper), a wastage of pulp, and increased overall costs.

The ADecTec System optimizes both paper machine and pulping system schedules simultaneously to minimize over-deliveries and create balanced schedules.



BRT: Brightness
tpd: Tons Per Day

Figure 3. Example of a Balanced Schedule.

Minimizing Schedule Changes and Stock-outs:

The ADecTec system optimizes trims for paper machines so that the demands for parent rolls are met in time. The system helps planners set inventory targets for the parent rolls and adjusts production schedules to minimize deviations from the set inventory targets. This minimizes the fluctuation of paper machine schedules due to sudden demand changes and prevents stock-outs. The steady run of paper machines improves productivity and minimizes overall production costs.

The ADecTec process schedules paper machines with respect to parent roll inventory targets. The result is that schedule changes and stock-outs are minimized.

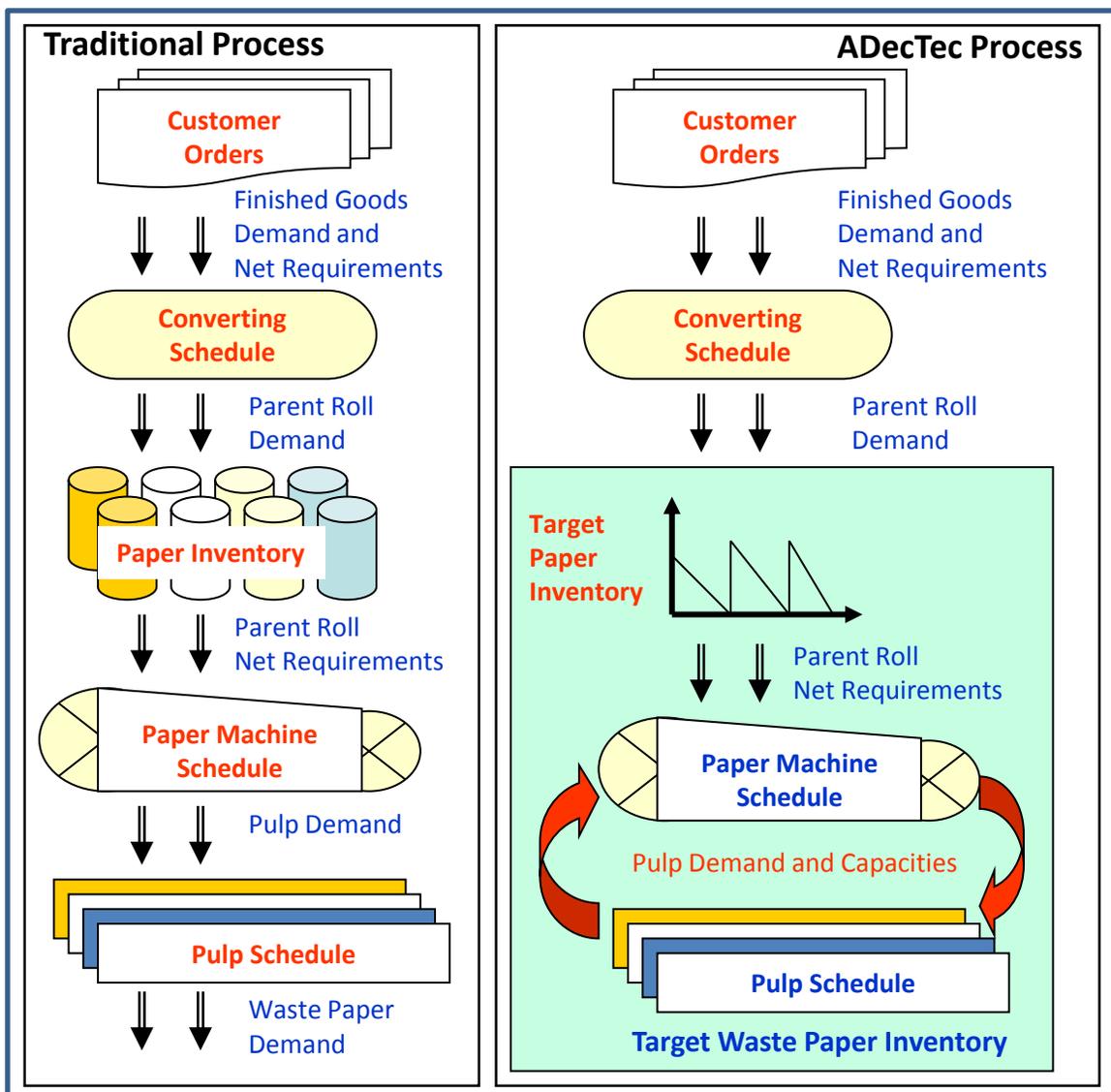


Figure 4: The ADecTec Process Paradigm

Main Modules of The ADecTec System:

- **Parent Roll demand manager**
 - Allows a planner to manage due dates, demand, earliest run out date, and view daily demand, production and inventory status of parent rolls
- **Parent roll inventory targets**
 - Allows a planner to manage inventory targets of parent rolls
- **Trim optimization**
 - Optimizes trims for paper grades
- **Batch sizing**
 - Determines the quantities of parent rolls to be produced to meet net requirements and inventory targets
- **Paper machine schedule optimization**
 - Optimizes paper machine schedules with trim optimization and grade transitions with explicit consideration to pulping constraints
- **Pulp system Schedule optimization**
 - Optimizes pulping system schedules with explicit considerations to paper machine requirements
- **Paper machine, pulping and waste paper recipe optimization**
 - Optimizes paper machine and pulping system schedules simultaneously with furnish and waste paper recipe optimization
- **Daily pulp balance visibility**
 - Provides visibility of daily pulp balance for the length of the schedule to identify pulp shortages
- **Waste paper inventory manager**
 - Computes daily waste paper inventory in real time
- **Waste paper demand forecast**
 - Projects the daily waste paper requirements based upon parent roll demand forecast and current schedule
- **System wide alerts**
 - Real time alerts on equipment and schedule status. Alerts are sent to planners' hand held devices informing if a tank is going to run empty or if a paper machine is going down.

About ADecTec:

Applied Decision Technologies, Inc. (ADecTec) provides process integrated business intelligence analytics and operations planning solutions. Our specialty is solving complex business problems using mathematical optimization techniques. We offer:

- Business intelligence and planning solutions for all manufacturing, supply-chain and service oriented companies
- Innovative technology services with custom development
- We are a minority-owned company.



info@ADecTec.com
Phone: (770) 789-1975
Fax: (678) 957-8750