

## TABLE OF CONTENTS

|  |    |
|--|----|
| <b>Chapter 1.0: Supply Chain Concepts</b> .....                                  | 1  |
| 1.1. Examples of Paper Industry Supply Chains .....                              | 2  |
| 1.2. Supply Chain Goals .....  | 5  |
| 1.3. The Importance of Lead Times .....  | 6  |
| 1.4. Manufacturing Environment .....   | 6  |
| 1.5. Scheduling and the Manufacturing Environment .....                          | 8  |
| 1.6. Manufacturing Process Choices .....   | 10 |
| 1.7. Manufacturing Lead Time .....   | 13 |
| 1.8. Examples of Manufacturing Environments in the Pulp and Paper Industry ..... | 14 |
| 1.9. Order Winners and Order Qualifiers .....                                    | 15 |
| 1.10. Independent Versus Dependent Demand and the Bill of Materials .....        | 15 |
| 1.11. Materials Planning .....   | 16 |
| 1.12. Supply Chain Themes .....  | 17 |
| 1.13. Supply Chains and the Order Fulfillment Process .....                      | 18 |
| 1.14. Pulp and Paper Industry Supply Chain Differences .....                     | 18 |
| 1.15. Applying Supply Chain Concepts .....                                       | 25 |
| 1.16. The Role of Systems .....  | 26 |
| <b>Chapter 2.0: Best Practices</b> .....   | 29 |
| 2.1. What Constitutes a Best Practice? .....                                     | 30 |
| 2.2. Best Practices Outline .....  | 30 |
| <b>Chapter 3.0: General</b> .....  | 31 |
| 3.1. End-to-End Process Review .....   | 31 |
| 3.2. Assessment of Upstream Processes and Quality .....                          | 32 |
| 3.3. Consistent Information Access .....   | 33 |
| 3.4. Consistent Service Metrics .....  | 33 |
| 3.5. Profitability Measures .....  | 34 |
| 3.6. Lead Time Management and Scheduling Flexibility .....                       | 35 |
| 3.7. Business Drives the System .....  | 36 |
| 3.8. Market and Product Allocation .....   | 37 |
| 3.9. Business Strategies and Objectives .....                                    | 38 |
| 3.10. Information Entered at Source .....  | 38 |
| 3.11. Correct Manufacturing Model .....  | 39 |
| 3.12. Scheduling/Forecasting and Choice of Manufacturing Model .....             | 40 |
| 3.13. Marginal Economics and Capacity Management .....                           | 41 |
| <b>Chapter 4.0: Demand Management/Forecasting</b> .....                          | 43 |
| 4.1. Forecast Only What Cannot be Planned .....                                  | 43 |
| 4.2. Flexible Forecasting .....  | 44 |
| 4.3. Inventory Replenishment .....   | 45 |
| 4.4. Customer to Manufacturer Item/SKU matching .....                            | 46 |
| 4.5. Forecast Level and Accuracy .....   | 46 |
| 4.6. Visibility into End User Demand .....                                       | 47 |
| 4.7. Sales and Order Planning Process .....                                      | 48 |
| 4.8. Finishing Materials Usage Forecasts .....                                   | 49 |
| 4.9. Two-level Forecasting .....   | 50 |

viii Table of Contents

- Chapter 5.0: Order Processing** ..... 51
  - 5.1. Capture/Analysis of Inquiry Data ..... 51
  - 5.2. Inquiry –Suggest Alternatives ..... 52
  - 5.3. Inquiry Capture and Basis for Order ..... 52
  - 5.4. Integration of Export Requirements ..... 53
  - 5.5. Pricing and Contract Management ..... 54
  - 5.6. Inquiry/Order Profitability ..... 55
  - 5.7. Upcharge Policy Versus Ordering Guidelines ..... 56
  - 5.8. Credit Management ..... 56
  - 5.9. Telephony Integration ..... 57
  - 5.10. Ability to Calculate Order Cycle Time ..... 58
  - 5.11. Single Point of Contact for Customers ..... 59
  - 5.12. Immediate Entry of Orders Upon Receipt ..... 60
  - 5.13. Unit Weight Calculations ..... 61
  - 5.14. Unit of Measure and End Use ..... 61
  - 5.15. Order Change Flexibility ..... 62
  - 5.16. Order Change/Edits ..... 63
  - 5.17. Invoicing Process and Accuracy ..... 64
  - 5.18. Price/Availability Response ..... 65
  - 5.19. Exception Reporting ..... 66
  - 5.20. Load Plans – When Generated? ..... 67
  - 5.21. Mixing Spec-Based and Item-Based Product Types ..... 68
  - 5.22. Order Sourcing Flexibility ..... 68
  - 5.23. Order Completion Through Load Plan Status ..... 69
  - 5.24. No Order Hard Copies or Forms in Use ..... 70
  - 5.25. Call-off of Customer-Specific Inventory ..... 71
  - 5.26. Document Distribution ..... 72
  - 5.27. Projected Late Orders ..... 73
  - 5.28. Order Status – Expected Amount ..... 73
  - 5.29. Account Management ..... 74
- Chapter 6.0: Purchasing** ..... 77
  - 6.1. Pay on Receipt/Usage ..... 77
  - 6.2. MRO Supplies ..... 78
  - 6.3. Raw Materials Purchasing ..... 79
  - 6.4. Finishing Materials Purchasing ..... 79
  - 6.5. Supplier Certification ..... 81
  - 6.6. Price Change Assessment/Simulation ..... 81
  - 6.7. Requisition and Ordering Process ..... 82
  - 6.8. Materials Inventory Policies ..... 83
  - 6.9. Appropriate Supplier Base ..... 84
  - 6.10. Source-Make Synchronization ..... 85
  - 6.11. Concurrent Engineering with Suppliers ..... 86
  - 6.12. Supplier Monitoring and Evaluation ..... 87
- Chapter 7.0: Scheduling** ..... 89
  - 7.1. Delivery Date Promising ..... 89
  - 7.2. Sheeter Block Scheduling ..... 90
  - 7.3. Sheeter Roll Dimensions ..... 91
  - 7.4. Assessment of Pricing & Sourcing Decisions ..... 92
  - 7.5. Matrix Machine Management ..... 93
  - 7.6. Block Scheduling – Block Definitions ..... 93
  - 7.7. Mechanism to Handle Repetitive Demand/Orders ..... 94
  - 7.8. Scheduling Accuracy ..... 95
  - 7.9. Requested and Trimmed Quantity ..... 96

|   |     |
|---|-----|
| 7.10. Dynamic Assignment  | 97  |
| 7.11. Accounting for Process Losses                                     | 98  |
| 7.12. Trim Usage—Inquiry through Manufacture                            | 99  |
| 7.13. Trim—Multiple Solutions Capability                                | 100 |
| 7.14. Group Orders for Trimming Parent Rewind Rolls                     | 101 |
| 7.15. Trimming—Soft Maximum Deckle                                      | 102 |
| 7.16. Trimming with Diameter Range                                      | 102 |
| 7.17. Trimming Across Winders and Mills                                 | 103 |
| 7.18. Financial Impact of Scheduling Decisions                          | 104 |
| 7.19. Flexible Quantity to Block Schedule—Order, Load, or Portions      | 105 |
| 7.20. "What If" Manipulation of Schedule                                | 106 |
| 7.21. "Soft" Block Scheduling   | 107 |
| 7.22. Pulp Draw Modeling/Usage  | 107 |
| <b>Chapter 8.0: Manufacturing</b>                                       | 109 |
| 8.1. Finishing Material Placement                                       | 109 |
| 8.2. Cutdown Units—Tracking Salvageable Size                            | 110 |
| 8.3. Integration of Product and Quality Information                     | 110 |
| 8.4. Reduction in Setup/Transition Times                                | 111 |
| 8.5. Management of Reels/Rolls by Length                                | 112 |
| 8.6. Operators Responsible for Quality Determination                    | 113 |
| 8.7. Operators Responsible for Routine Maintenance/Upkeep               | 114 |
| 8.8. Item-Based Manufacturing   | 115 |
| 8.9. Pulp Quality Matching  | 116 |
| 8.10. Pulp Quality Tracking   | 117 |
| 8.11. Capital Investments and Sunk Costs                                | 118 |
| 8.12. Machine Production Simulation                                     | 119 |
| 8.13. Monitoring Adherence to Schedules                                 | 119 |
| 8.14. Run Adherence Planning  | 120 |
| 8.15. Management of Order Quantity Adherence                            | 121 |
| 8.16. Lack of Machine and Position Restrictions                         | 122 |
| 8.17. Real-Time Process Costing   | 123 |
| 8.18. Use of Quality Specifications and Tolerances                      | 124 |
| 8.19. Building of Machine Reels   | 124 |
| 8.20. Shrinkage Tracking, Analysis, and Reporting                       | 125 |
| 8.21. Tracking Product Genealogy  | 126 |
| 8.22. Operator Empowerment and Customer Service                         | 127 |
| 8.23. Off-Quality Policy  | 128 |
| <b>Chapter 9.0: Inventory Management</b>                                | 131 |
| 9.1. Manage Inventory in Aggregate before Detail                        | 131 |
| 9.2. Unit of Inventory Tracking   | 132 |
| 9.3. Third Party Relationships and Products                             | 133 |
| 9.4. Capture of Warehouse Transactions                                  | 134 |
| 9.5. Off-Quality and Broke Tracking                                     | 134 |
| 9.6. Inventory Check before Pegging to Schedule                         | 135 |
| 9.7. Postponement   | 136 |
| 9.8. Substituting Information for Inventory                             | 137 |
| 9.9. Inventory Assignment—Either by Order (# of Units) or Specific Unit | 138 |
| 9.10. Use of cycle Counting for Physical Inventories                    | 139 |
| 9.11. Inventory Location Tracking                                       | 140 |
| 9.12. Automatic Load/Bay Management                                     | 140 |
| 9.13. Projection of Inventory Levels                                    | 141 |
| 9.14. Predict Load Starting/Ending Times from Schedules                 | 142 |
| 9.15. Applying Trim to Determine Width of Master/Parent Rolls           | 143 |
| 9.16. Inventories—One Version of the "Truth"                            | 144 |

**x Table of Contents**

|   |     |
|---|-----|
| <b>Chapter 10.0: Distribution</b> .....                             | 147 |
| 10.1. Appropriate Use of Vehicle Storage .....                      | 147 |
| 10.2. Review of Distribution Network .....                          | 148 |
| 10.3. Shipping Capacity Constraints .....                           | 149 |
| 10.4. Shipment Planning Basis .....                                 | 150 |
| 10.5. Rail Freight Rates .....                                      | 150 |
| 10.6. Alternatives to Pool Truck Schedules .....                    | 151 |
| 10.7. Shipment Release .....  | 152 |
| 10.8. Automated Freight Bill Matching .....                         | 153 |
| 10.9. Load Pattern Management .....                                 | 154 |
| 10.10. Freight Rate Maintenance .....                               | 155 |
| 10.11. Warehouse Organization .....                                 | 156 |
| 10.12. Shipping Requirements Forecast .....                         | 157 |
| 10.13. Delivery Appointments .....                                  | 158 |
| 10.14. Load Consolidation and Optimization .....                    | 159 |
| 10.15. Load Planning—Option to "Fill" Vehicle .....                 | 160 |
| 10.16. Container Planning/Optimization .....                        | 160 |
| 10.17. Vehicle Capacity and Utilization .....                       | 161 |
| 10.18. Mixed-mode and Cross-dock Distribution .....                 | 162 |
| 10.19. Re-Use of Packaging and Loading Materials .....              | 163 |
| 10.20. Spot freight Rates .....                                     | 163 |
| 10.21. Use of Freight Information in Decision-Making .....          | 164 |
| 10.22. External Warehouse Management .....                          | 165 |
| 10.23. Use of Delivery Information with Customers, Consignees ..... | 166 |
| 10.24. Transit Time Monitoring, Maintenance .....                   | 167 |
| 10.25. Collaborative Logistics .....                                | 168 |
| <b>Chapter 11.0: Case Studies</b> .....                             | 169 |
| Case 1: ABC Cutsite, Inc. ....                                      | 169 |
| Case 2: Random Lakes Newsprint .....                                | 170 |
| <b>Bibliography</b> .....   | 177 |
| <b>Glossary</b> .....   | 179 |