

Paper Conference and Trade Show (PaperCon 2017)

Renew, Rethink, Redefine the Future

Minneapolis, Minnesota, USA
23-26 April 2017

Volume 3 of 3

ISBN: 978-1-5108-4728-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by the TAPPI Press
All rights reserved.

Printed by Curran Associates, Inc. (2017)
For permission requests, please contact the TAPPI Press



at the address below.

TAPPI Press
15 Technology Parkway South
Peachtree Corners, Georgia 30092

Phone: (800) 332-8686
Fax: (770) 446-6947

memberconnection@tappi.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

APPLICATIONS OF MICROFIBRILLATED CELLULOSE IN PAPERMAKING

SURFACE APPLICATION OF MICROFIBRILLATED CELLULOSE FOR SHEET QUALITY IMPROVEMENT	1
<i>M. Foulger, D. Cowles</i>	
FASTER FIBRILLATING LYOCCELL, A NOVEL FIBER FOR WET-LAID NONWOVEN APPLICATIONS	5
<i>S. Kulka, J. Manner, B. Koll, A. Slater, M. Gallo</i>	

BARRIER COATING APPLICATION TECHNIQUES

CURTAIN COATING FOR PAPER INDUSTRY – SINGLE AND MULTILAYER	10
<i>H. Doll</i>	
SLOT COATING OF NANOCELLULOSE ON PAPERBOARD	17
<i>V. Kumar, D. Bousfield, M. Toivakka</i>	
CONDUCTIVE CARBON-NANOCELLULOSE COATINGS ON PAPER	26
<i>V. Kumar, S. Forsberg, A.-C. Engstrom, M. Nurmi, C. Dahlstrom, M. Toivakka</i>	
DETERMINATION OF REPULPABILITY OF TALC-FILLED BIOPOLYMER DISPERSION COATINGS AND OPTIMIZATION OF REPULPED REJECT FOR IMPROVED MATERIAL EFFICIENCY BY TAILORING COATINGS	36
<i>S.-S. Ovaska, K. Mielonen, J. Lyttikainen, U. Hirn, K. Backfolk</i>	

BEST PRACTICES FOR PROCESS CONTROL-QCS, DCS & WIS

P&ID'S, THE NEGLECTED BEST PRACTICE	49
<i>D. Dicksey, D. Cifuentes</i>	
DCS UPGRADE AND MAINTENANCE	55
<i>D. Worzalla</i>	
BEST PRACTICES FOR WEB INSPECTION IN THE PULP AND PAPER INDUSTRY	60
<i>B. Mock</i>	
BEST PRACTICES FOR MAINTAINING QCS SCANNING SYSTEMS AT PRISTINE CONDITIONS	63
<i>S.-C. Chen, A. Hellstrom, C. Liu</i>	

BEST PRACTICES IN PAPERMAKING SYSTEMS

BEST PRACTICES - STEAM SYSTEM DESIGN AND OPERATION FOR IMPROVED RELIABILITY AND ENERGY UTILIZATION	76
<i>M. Soucy</i>	
PAPERMAKING BEST PRACTICES WITH VACUUM-DEWATERING SYSTEMS	108
<i>D. Sweet</i>	
BEST PRACTICES IN DOCTORING	119
<i>A. Lizarraga</i>	

CLASSICAL ADDITIVES

TOWARDS A MECHANISM FOR SURFACE HYDROPHOBIZATION OF PAPER	131
<i>F. Iselau, K. Holmberg, R. Bordes</i>	
RETHINKING RAW WATER PREPARATION TOWARD MORE EFFICIENT PAPER MAKING	140
<i>E. Luth, M. Morgan, M. Callejo, L. Rice, L. Lund</i>	

EFFECTIVE BIOFILM CONTROL FOR MAXIMIZED RUNABILITY WITH MINIMIZED CORROSION CONCERNS MONITORED ON-LINE	147
<i>M. Kolari, M. Nelson, K. Keegan, J. Ekman</i>	

COATING OPERATIONS SUCCESS STORIES

MIDWEST U.S. CASE STUDY ON PROCESS AIR FANS UNDERPERFORMING, AND THEIR IMPACT ON COATED PAPER PRODUCTION	156
<i>D. Cesario</i>	
ENHANCING LINERBOARD WITH OFFLINE COATING	164
<i>B. Meyer</i>	
CHALLENGES OF APPLYING WATER-BASED BARRIER COATINGS WITH A METERED SIZE PRESS - SUSTAINABLE FIBER SOLUTIONS	175
<i>N/A</i>	
COATING & GRAPHIC ARTS PAPER QUALITY & PRODUCTION IMPROVEMENT SYSTEM.....	182
<i>P. Angle</i>	
SPECIALTY PAPER DEFECT DETECTION ON MULTIPLE OMCS.....	193
<i>P. Karhula</i>	
USING COVER TECHNOLOGY TO IMPROVE CALENDAR PERFORMANCE	201
<i>B. Carney</i>	

CONCEPTS IN FUNCTIONAL COATING

CONTRASTING UNDERLYING MECHANISMS OF DIFFERENT BARRIER COATINGS TYPES.....	212
<i>B. McCulloch, J. Roper, K. Rosen</i>	
THE ROLE OF BASE SUBSTRATE ON BARRIER AND CONVERTABILITY PROPERTIES OF WATER BASED BARRIER COATED (WBBC) PAPER AND PAPERBOARD	220
<i>P. Miettinen, M. Ahokas, T. Engstrom, J. Heinonen, S. Auvinen</i>	
MULTI LAYERS OR DRYING STRATEGY TO AVOID PINHOLES BY SUSTAINABLE BARRIER COATING?	233
<i>P. Emilsson</i>	

CONSISTENCY TRANSMITTER MEASUREMENT TECHNOLOGY & PROCESS CONSIDERATIONS

CONSISTENCY TRANSMITTER MEASUREMENT TECHNOLOGY & PROCESS CONSIDERATIONS	235
<i>M. Hendricks</i>	
REDUCE CASE PACKING DOWNTIME WITH RFID & IO-LINK TECHNOLOGY.....	283
<i>N/A</i>	

DRIER WEB

CONTINUOUS PRESSURE GAP FORMING: SHOE BLADE FORMING FOR PUBLICATION GRADES	289
<i>V. Wildfong, J. Irwin, M. Bouchard, S. Grillo, S. Stewart, M. Odell, J. Shands, B. Porter</i>	
THE EFFECT OF PRESS NIP GEOMETRY AND WEB TEMPERATURE ON DRYNESS, DENSITY AND PAPER PROPERTIES	297
<i>P. Krochak, C. Ostlund</i>	
NUMERICAL SIMULATION OF WET-PRESSING PROCESS BY USING LATTICE-BOLTZMANN LATTICE-SPRING MODEL	301
<i>Y. Tang, Y. Luo, T.-H. Wu, D. Qi</i>	

ENERGY CONSERVATION IN RECYCLE PAPERBOARD MILLS

GHG EMISSIONS FOR RECYCLED PAPERBOARD MILLS	316
<i>S. Deodhar</i>	

ENERGY SAVINGS AT THE PAPER MACHINE DRYER HOOD	331
<i>A. Sarli</i>	
PAPER MACHINE ENERGY BEST PRACTICES	341
<i>D. Reese, T. Hasbargen</i>	

FIBER PREP FOR TISSUE

OVERVIEW OF TISSUE GRADES AND THEIR PULP FURNISH SELECTION	370
<i>X. Zou</i>	
REFINING OF HW AND SW KRAFT FOR TISSUE MAKING	384
<i>X. Zou</i>	
ENZYMATIC MODIFICATION OF PULP FIBERS	394
<i>K. Macdonald</i>	

FIBERS 1-NANO FIBER PRODUCTIONS

THE STATUS OF CELLULOSE NANOMATERIAL PRODUCTION FOR NONWOVEN APPLICATIONS	404
<i>J. Zhu</i>	
MASS PRODUCTION OF POLYIMIDE NANOFIBERS FOR APPLICATION IN LI-ION BATTERY, FILTRATION AND TEXTILES	423
<i>H. Hou</i>	
POLYLACTIC ACID MICROFIBERS FOR WET-LAID NONWOVEN PROCESSES	450
<i>J. Allen, J. Daponte, K. Dema, A. Bolton</i>	

FIBERS 2-NEW APPLICATIONS

FIBER- AND FABRIC-BASED DEVICES FOR ENERGY CONVERSION AND SENSING APPLICATIONS	460
<i>M. Shtein</i>	

FILTRATION-SEPARATION

NEW HYDROPHOBIC FASTER CURING POLYMER FOR AIR FILTRATION APPLICATIONS	490
<i>D. Watt</i>	
OIL SORPTION BEHAVIOR OF COTTON NONWOVEN SUBSTRATES	506
<i>A. Jain, S. Ramkumar</i>	

FOAM TECHNOLOGY SEMINAR 1-THE STATE OF FOAM FORMING TECHNOLOGY

EFFECT OF AMPHIPHILIC COMPOUNDS IN FOAM FORMING	520
<i>W. Xiang, S. Li, I. Filpponen, E. Saharinen, K. Salminen, T. Lappalainen, O. Rojas</i>	
REAL-TIME MONITORING OF BUBBLE SIZE DISTRIBUTION IN FOAM FORMING PROCESS	532
<i>H. Eloranta, A. Jasberg, P. Martikainen, H. Kiiskinen</i>	
FAST FLASH MIXING IN GENERATION OF MICRO AIR BUBBLES FOR FOAM AND PROCESS DYNAMICS IN FOAM FORMING	541
<i>J. Matula, J. Matula, J. Cecchini, R. Vesala</i>	
POLYVINYL ALCOHOL AS FOAMING AGENT IN FOAM FORMED PAPER	553
<i>J.-M. Gottberg, T. Lappalainen, K. Salminen</i>	
MAINTAINING BULK OF FOAM FORMED STRUCTURES IN PRESSING AND CALENDERING	563
<i>R. Pihko, J. Ketoja, I. Nurminen</i>	

FOAM TECHNOLOGY SEMINAR 2

PROGRESS IN FOAM FORMING TECHNOLOGY	571
<i>H. Kiiskinen, E. Hellen</i>	
FOAM FORMING TECHNOLOGY FOLDING BOX BOARD FOCUSED DEVELOPMENTS	585
<i>D. Bunker, J. Cecchini, M. Hietaniemi, P. Martikainen, K. Salminen</i>	
STRENGTH SOLUTIONS FOR FOAM FORMED WEBS	597
<i>J. Lindfors, M. Hietaniemi, M. Virtanen, K. Torvinen, J. Asikainen, K. Salminen</i>	

VOLUME 2

FUNDAMENTALS OF COATING STRUCTURE

EFFECT OF PARTICLE SHAPE AND SIZE DISTRIBUTION ON DEWATERING AND FILTERCAKE PERMEABILITY	607
<i>L. Weeks, D. Bousfield, P. Hayes</i>	
DISCRETE ELEMENT METHOD TO PREDICT COATING FAILURE MECHANISMS	620
<i>D. Varney, D. Bousfield</i>	
THE EFFECT OF PAPER SUBSTRATE ON STARCH AND LATEX SEPARATION	638
<i>E. Golebiowska, D. Bousfield, W. Gramlich</i>	
MECHANICAL PROPERTIES OF FREE STANDING PIGMENTED COATING LAYERS WITH LATEX AND STARCH AS BINDER: BENDING, TENSILE AND PICKING PROPERTIES	646
<i>S. Najafi, D. Bousfield, M. Tajvidi</i>	

FUNDAMENTALS OF FORMING

HOW TO USE THE TENSILE STIFFNESS INDEX (TSI) AREA, WHEN OPTIMIZING YOUR HEAD BOX OR PAPER MACHINE, EXPERIENCES FROM FIELD TRIALS	658
<i>G. Lindblad</i>	
HEADBOX INDUCED SHEET VARIABILITY	673
<i>P. Krochak, B. Norman, L. Hermansson, C. Holmqvist</i>	
TABLE DRAINAGE AND PRESS DEWATERING WHEN CELLULOSE NANOFIBERS ARE APPLIED ON THE WET END	681
<i>D. Bousfield, M. Paradis, D. Johnson, M. Bilodeau</i>	
MAXIMIZING THE PERFORMANCE OF YOUR ADJUSTABLE FOURDRINIER TABLE WITH FORMING FABRIC DESIGN	689
<i>M. Boettcher, S. Stewart</i>	

INJECTION TECHNOLOGY

POSSIBLE BENEFITS OF ADDING RETENTION AIDS AS WELL AS CATIONIC STARCH FOR DRY STRENGTH VERY CLOSE TO THE HEADBOX	695
<i>P. Krochak, I. Ostlund, C. Ankerfors, M. Gimaker, A. Waljanson, L. Hermansson</i>	
DOSING OF WET END ADDITIVES IN PREMIXED PAIRS AND GROUPS IN A FLASH MIXING REACTOR CHALLENGES OLD RULES WITH GREAT ECONOMICAL BENEFITS	705
<i>J. Matula</i>	

LOW CONSISTENCY REFINING STRATEGY DEVELOPMENT

LOW CONSISTENCY REFINING STRATEGY DEVELOPMENT	714
<i>N/A</i>	

MAINTENANCE & RELIABILITY

FOURDRINIER INSPECTION MUCH FASTER AND MORE EFFICIENT WITH NEW LASER TRACKER TECHNOLOGY	754
<i>L. Kubale</i>	

THE TIMKEN ADAPT™ BEARING FOR PAPER MACHINE APPLICATIONS	759
<i>N. Los</i>	

MAINTENANCE & RELIABILITY TISSUE TEASER

REEL COMPONENT MISALIGNMENT CAN CAUSE REAL ISSUES	765
<i>L. Kubale</i>	
TAKE CONTROL OF YOUR ROLL MAINTENANCE COSTS AND YOUR PAPER QUALITY.....	771
<i>K. Braun</i>	
THE MAINTENANCE DEPT. VS THE MAINTENANCE FUNCTION	776
<i>J. Shellogg</i>	

MAINTENANCE RELIABILITY

REACTIVE TO PROACTIVE - THE APPLICATION OF STRATEGIC RELIABILITY PRINCIPLES.....	786
<i>J. Shellogg</i>	
LEVERAGING RELIABILITY BEST PRACTICES TO DRIVE BUSINESS PERFORMANCE	796
<i>T. Dotson</i>	

MATERIALS FOR BARRIER COATINGS

POLYOLEFIN BASED WATERBORNE BARRIER COATINGS FOR PAPERBOARD.....	822
<i>J. Katzenstein, K. Rosen, C. Ellison, J. Roper, R. Smith</i>	
THE EFFECT OF LATEX CHARACTERISTICS AND ADDITION LEVEL ON THE PROPERTIES OF CELLULOSE NANOFIBER FILMS.....	826
<i>V. Kumar, E. Lazarus, P. Salminen, D. Bousfield, M. Toivakka</i>	
EFFECTS OF MONTMORILLONITE, KAOLINITE, PROTEIN, AND AKD ON NANOCELLULOSE-BASED BARRIER COATINGS FOR PACKAGING.....	837
<i>P. Tyagi, L. Pal, M. Hubbe, L. Pal</i>	

MICROFIBRILLATED CELLULOSE

MOLECULAR CELLULOSE AS ADDITIVES IN PAPERMAKING	853
<i>H. Wang, R. Lu, X. Zhang, R. Briber</i>	
SURFACE APPLICATION OF CELLULOSE NANOFIBRILS TO FINE PAPER USING DIFFERENT BASE SHEET FREENESS LEVELS.....	860
<i>D. Johnson, M. Paradis</i>	
APPLICATIONS OF CO-PROCESSED MICROFIBRILLATED CELLULOSE AND MINERAL IN PACKAGING	872
<i>J. Phipps, P. Svending, T. Selina, J. Kritzing, T. Larson, D. Skuse, S. Ireland</i>	

NEW TECHNOLOGIES IN PAPER AND BOARD MAKING

SINGLE-STAGE HYDROCYCLONE FRACTIONATION OF REFINED BLEACHED SOFTWOOD PULP	878
<i>E. Bjork, H. Vomhoff, M. Lindgren</i>	
VISUALIZATION AND CHARACTERIZATION OF 3D STRUCTURE OF FIBROUS POROUS BIO-BASED MATERIALS, AND THEIR RELATIONSHIP TO PROPERTIES AND PERFORMANCE.....	906
<i>S. Ramanna, Y. Defrenne, V. Zhdankin, B. Ramarao, H. Pande, S. Ramaswamy</i>	
INNOVATIVE PAPER-TECHNOLOGY FOR NOVEL LONGITUDINALLY CORRUGATED LAYERS.....	912
<i>M. Sterner, M. Magnusson</i>	

NONWOVEN TESTING TUTORIAL

TESTING OF NONWOVEN FABRICS	917
<i>R. Broughton, B. George</i>	

NOVEL POLYMERIC MATERIALS

WATER-BASED POLYMERS FOR HEAT-SEALABLE, LIQUID BARRIER COATINGS	985
<i>P. Sardashii, G. Deeter, J. Rigney, A. Seecharan</i>	
DEVELOPMENT AND PERFORMANCE OF ENZYMATICALLY MODIFIED LIGNOSULFONATES AS COATING BINDERS	986
<i>K. Hofer, A. Ortner, G. Nyahongo, H. Winter, K. Mahler, G. Gubitz, W. Bauer</i>	
NOVEL MATTE FINISHES	995
<i>Y. Guo, L. Jopko, K. Yiadom, R. Gaston</i>	

PAPER MICRO-STRUCTURE

INTERACTIONS BETWEEN POROSITY, INTERNAL BONDING AND FORMATION IN MODERN PAPERMAKING PROCESSES	1003
<i>A. Puurtinen, J. Cecchini</i>	
MECHANICS OF CREPING PROCESS IN TISSUE MAKING: MODELING AND EXPERIMENTS	1011
<i>K. Pan, A. Srikantha, Phani, S. Green</i>	

PAPERMAKING SUCCESS STORIES

INNOVATIVE MODULARIZATION PRACTICES FOR PAPER MACHINE REBUILDS	1013
<i>K. Knoernschild</i>	
VACUUM SYSTEM REBUILD STORA ENSO SKOGHALL BM8	1019
<i>J. Lahtinen</i>	
PAPER MILL CONVERSION FROM COATED PRINTING PAPERS TO RECYCLED CORRUGATING MEDIUM	1031
<i>N/A</i>	
SOLVING PROBLEMS TOGETHER	1039
<i>N/A</i>	

PRINT TECHNOLOGY

UV/EB IN PRINTING	1054
<i>N/A</i>	
A MEMORY EFFECT IN SHEET-FED OFFSET PRINTING	1098
<i>W. Fuchs, M. Dauer, U. Hirn, W. Bauer</i>	
FUTURE OF INKJET PRINTING	1107
<i>J. Pennington</i>	

PROCESS OPTIMIZATION

RETHINKING BEST PRACTICES, FELT CLEANING AND CONDITIONING	1118
<i>J. Sambs, H. Laser, D. Kelso</i>	
PCA – THE CHEMICAL DOCTORING SYSTEM	1124
<i>C. Wassmer, D. Wall</i>	

PROCESS STABILITY THROUGH OPERATIONAL MANAGEMENT IN RECYCLE MILLS

MANAGEMENT OF COMBUSTIBLE GASES IN OCC STOCK CHESTS	1134
<i>P. Hajakian</i>	

PROCESS STABILITY THROUGH STANDARD WORK	1145
<i>N/A</i>	
OPERATIONAL EXCELLENCE IN THE ERA OF BIG DATA: THE DIGITAL MILL	1157
<i>M. Sandin</i>	
UTILIZATION OF DATA FOR DIAGNOSTICS & PROCESSES TRANSPARENCY	1169
<i>P. Niemelainen</i>	

PROCESS VARIABILITY TROUBLESHOOTING

PROCESS VARIABILITY TROUBLESHOOTING TUTORIAL	1175
<i>P. Kristopeit</i>	

VOLUME 3

PROCESS WEB FORMATION

HIGHLY DISPERSIBLE SYNTHETIC FIBERS FOR WET LAID APPLICATIONS	1211
<i>J. Pawlak, H. Sadeghifar, J. Allen, S. Perri</i>	
AIR-LAID RANDO WEB FORMATION AND ITS CAPABILITY FOR DIFFERENT APPLICATIONS	1227
<i>S. Shekhar</i>	

PRODUCTIVITY

PAPERMAKING ADDITIVES TRACK	1242
<i>S. Rosencrance</i>	
IMPROVING PAPER MACHINE EFFICIENCY WITH A NEW PRODUCTION AID	1251
<i>R. Covarrubias, M. Rizcallah</i>	
IMPACT OF CONDUCTIVITY ON PAPER/BOARD MACHINE PERFORMANCE AND STABILITY – REVIEW AND NEW EXPERIENCES	1257
<i>L. Xu, P. Pruszynski, P. Hart</i>	

REBUILD BEST PRACTICES

A SUCCESSFUL PROJECT EXECUTION IN P&P – BEHIND THE SCENES, DISCOVER THE DARK SIDE OF THE MOON	1276
<i>M. Mejsner</i>	
HEAVYUP AND SLOW DOWN A MACHINE	1280
<i>T. Jacobs</i>	
UTILIZATION OF LASER SCANNING AND 3-D MODELING IN PAPER MACHINE REBUILDS	1286
<i>B. Morse</i>	

RECYCLE IN PACKAGING

NOVEL STARCH SAVING PROGRAM IMPROVES SUSTAINABILITY IN BOARD MANUFACTURING THROUGH THE REUSE OF RECYCLED FIBER STARCH	1293
<i>J. Ekman, M. Hietaniemi, M. Kolari, M. Nelson, K. Keegan</i>	
EFFECTIVE UTILIZATION OF RECYCLED FIBER IN VIRGIN PACKAGING	1303
<i>B. Altherr</i>	

REDEFINING WIS-MACHINE VISION NEEDS AND FUNCTIONS

REAL-TIME FULL WEB FORMATION AND SURFACE FORMATION ANALYSIS	1310
<i>T. Huotilainen, M. Laster, S. Riikonen, E. Kondratiev</i>	

HOW SHOULD OPERATORS AND MILL PROCESS APPLICATION ENGINEERS USE VISION SYSTEM INFORMATION TO TAKE IMMEDIATE ACTION TO IMPROVE PRODUCT QUALITY AND MACHINE EFFICIENCIES?	1341
<i>P. Kasameyer, F. Levac, J. Zyglis</i>	

RENEWING QCS APPLICATIONS

REDUCTION OF TWIST ON BOARD MACHINES	1348
<i>J. Shakespeare</i>	
NEW OR REFINED LIQUID MEASUREMENTS FOR BETTER CONTROL OF A PAPER MACHINE OR COATER	1362
<i>M. Crable</i>	
MANAGEMENT OF DIMENSIONAL STABILITY	1367
<i>S. Nuyan, J. Lehtioksa, D. Tomihiro</i>	

RETHINKING ANALYSIS TECHNIQUES AND STATISTICS FOR PROCESS VARIABILITY

ONLINE PROFILE SPECTRAL VIEW FOR PROCESS TROUBLESHOOTING	1374
<i>B. Beyer</i>	
PAPER MACHINE PROCESS VARIABILITY IMPROVEMENTS FROM DIGITAL TECHNOLOGY EVOLUTION	1382
<i>T. Murphy, P. Hinchcliffe, K. Starr, K. Praprost, D. Wright</i>	
MINI-TUTORIAL: THE DIFFERENCES AND SIMILARITIES BETWEEN TAPPI 545 AND TIP1101	1404
<i>M. Forbes, K. Figiel, S.-C. Chen</i>	
THE NEW TIP1101-01, ADDING POWER AND SIMPLICITY TO REEL STATISTICS	1414
<i>K. Figiel, I. Journeaux, J. Backstrom, S.-C. Chen, M. Forbes, C. Fu, K. Masters, N. McDevitt, T. Murphy, S. Nuyan, J. Tippett</i>	

RETHINKING QCS CONTROLS

AN APPROACH FOR FEEDFORWARD MODEL PREDICTIVE CONTROL FOR PULP AND PAPER APPLICATIONS: CHALLENGES AND THE WAY FORWARD	1441
<i>M. Rahman, A. Avelin, K. Kyprianidis, E. Dahlquist</i>	
ACTIVE RETENTION CONTROL AND REDUCED ASH VARIABILITY USING ADVANCED PROCESS CONTROL	1451
<i>A. Anand, A. Badwe, R. Satini</i>	
A STUDY OF ADVANCED FINISHING CONTROL IMPLEMENTATION ON A SUPERCALENDER	1460
<i>M. Held, K. Lantz</i>	

RETHINKING THE USE OF PROCESS CONTROL TO REDUCE BASIS WEIGHT ON BOARD GRADES

USING AUTOMATION TO PREDICT AND CONTROL BOARD STRENGTH PROPERTIES IN REAL-TIME	1470
<i>G. Fralic, P. Virtanen, M. Viitamaki, T. Kalkaja, K. Vanpembrook</i>	
CHANGING PAPER GRADES AND PRODUCT MIX USING ADVANCED INSTRUMENTATION	1491
<i>F. Cunnane</i>	
SIMPLIFIED MODEL PREDICTIVE MD CONTROL FOR GRADE CHANGE	1506
<i>M. Forbes, C. Gheorge, J. Choi, P. Nafissi</i>	

STEAM SHOWERS

STEAM SHOWERS TUTORIAL	1514
<i>P. Wells</i>	

STOCK PREP OPTIMIZATION

RE-PULPING AND SCREENING OF PRINTED ELECTRONICS – A MATERIAL BALANCE APPROACH TO EXAMINE METALS PARTITIONING IN PAPER RECYCLING AND PAPERMAKING SYSTEM	1557
<i>J. Atkinson, A. Mondala, T. Joyce, M. Joyce, D. Fleming, J. Pekarovic</i>	
REDUCING WATER SYSTEM SOLIDS LOADING - DISC FILTER OPTIMIZATION	1568
<i>N. Reinke</i>	

STRENGTH

ADVANCES IN PAPERMAKING WET END CHEMISTRY APPLICATION TECHNOLOGIES	1592
<i>M. Hubbe, S. Rosencrance, S. Broschart</i>	
USING REAL-TIME PREDICTIVE MODELING IN STRENGTH PROPERTIES	1599
<i>G. Hopkins</i>	
USAGE OF FINES-ENRICHED PULP TO INCREASE STRENGTH IN CTMP	1607
<i>E. Bjork, H. Vomhoff, M. Bouveng</i>	
ACHIEVING HIGH STRENGTH TARGETS IN PACKAGING	1632
<i>S. Broschart, J. Block</i>	

SUSTAINABILITY

GLOBAL LIFE CYCLE ASSESSMENT OF COTTON	1639
<i>N/A</i>	
FORMALDEHYDE REDUCTION IN BINDERS USED IN NONWOVENS AND TEXTILE PRODUCTS	1663
<i>H. Ray, P. Nedwick, P. Yang, E. La Fleur</i>	
THE USE OF HEMP FIBERS IN NONWOVEN WIPES	1675
<i>D. Xin, B. George</i>	

TISSUE CONVERTING EFFICIENCY

REDUCE CASE PACKING DOWNTIME WITH RFID & IO-LINK TECHNOLOGY	1688
<i>N/A</i>	
TISSUEPLS PLANT LAYOUT SIMULATOR	1694
<i>N/A</i>	
UNDERSTANDING THE IMPACT OF TISSUE UNIFORMITY ON CONVERTING EFFICIENCY	1703
<i>J. Saberian</i>	

TISSUE CREEPING

YANKEE DRYING SYSTEM STRATEGY TO IMPACT SHEET QUALITY	1709
<i>A. Sarli</i>	
YANKEE CHEMICAL COATING SYSTEMS	1722
<i>D. Welsford</i>	
GENERAL CREPING THEORY AND IMPACTS OF BLADE DESIGN ON CREPING	1742
<i>J. Peters</i>	

TOOLS TO AID YOUR BEST PRACTICES

HOW THERMOGRAPHY CAN BE A VALUABLE TOOL TO PAPERMAKERS	1760
<i>R. Thon</i>	
BEST PRACTICES CAN BE QUANTIFIED ON GRADE CHANGES, ENERGY SAVING PROJECTS, AND PROCESS CONTROL PARAMETERS	1768
<i>F. Cunnane</i>	
PHOTOGRAMMETRY AS A TOOL FOR STOCKPILE MEASUREMENT	1784
<i>M. Margol</i>	
Author Index	