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Tutorial 1: IEEE IAS/TAPPI Paper Machine Drives Short Course

(12 hour session: Thursday, June 22 – noon Friday 23, 2017)
Presented in conjunction with the IEEE Pulp, Paper & Forest
Industries Technical Conference

This course on paper machine drives will aid in the complete understanding of the selection, operation, troubleshooting, and maintenance of all paper machine drive systems, ac or dc.

Course Overview

Taught by paper machine drive engineers, all of whom have had many years of experience in drives on the paper machine, this course will help you understand the power demand calculations, the drive configurations for the sections, the detail application of ac drives, analysis of problems and the troubleshooting techniques, proper installation techniques and “gotchas” plus what to do to upgrade an existing drive system. All of this is directed to the drives of the paper machine.

This course focuses on the knowledge to apply basic paper machine drives to day-to-day operations, and will provide you with the know-how to evaluate and select paper machine drives, and modern machine configurations.

Why Attend?

- Increase your problem solving skills through team activities and practical problem-solving exercises
- Get personalized answers to specific questions and operating situations
- Learn how to use disturbance analysis for problem solving
- Achieve increased production volume due to less downtime

Who Should Attend?

Those who will benefit most include:

- Anyone in the mill with responsibility for the drives on a paper machine
- Anyone with corporate responsibility for the drives on a paper machine
- Consultants responsible for paper machine drives
- Mill/Plant Engineers
- Mill/Plant Maintenance Engineers and Lead Operators
- Application and Design Engineers (Controls and OEMs)
- Staff Engineers
- Electrical Superintendents
- Suppliers of Paper Mill Drives



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Past Participants Have Said

"Now I'll be able to..."

- Help solve the machine maintenance issues, reduce failures and improve future designs
- Apply this knowledge to more effectively communicate with drive maintenance technicians
- Look at PM drives for upgrades and sizing
- Look for adequate grounding for CMC and CMV causing bearing failures
- Look at capabilities for speed-up
- Troubleshoot drives"

Learning Outcomes:

After successfully completing this course, participants should be able to:

- Discuss the range of modern paper machinery and modern machine configurations
- Calculate drive HP using "unit constant" or "component value" theory
- Explain the fundamental relationships between mechanical and electrical systems and identify major application considerations of drive train components.
- Discuss AC drive selection and application, as well as installation and economic considerations of AC vs DC drives.
- Describe existing load and speed data for rebuilding a paper machine and evaluate data for HP selection
- Apply the fundamentals of disturbance analysis techniques to solve problems

Short Course Chairmen:

- Bob Van Lieshout, Rockwell Automation,
- Burt Judson, Retired

Preliminary Course Schedule

Thursday All Day

June 26 a.m. Wet End Drive Sizing (Power Calculations), *Tom Trueb, EFI Solutions, Inc.*

June 26 a.m. Dynamic Analysis and Troubleshooting, *Mark Weaver, 3 Quarks Engineering*

June 26 a.m. Wet End Control Configurations, *Mike Highsmith, Rockwell Automation*

12:00 p.m. Lunch

June 26 p.m. Dry End Drive Sizing (Power Calculations), *Mark Weaver, 3 Quarks Engineering*

June 26 p.m. Dry End Control Configurations, *Mike Highsmith, Rockwell Automation*

June 26 p.m. Application and Selection Guidelines for AC System Drives, Bob Van Lieshout, *Rockwell Automation*

June 26 p.m. Drive System Upgrades, *Tom Trueb, EFI Solutions, Inc.*

5:00pm Adjourn for the Day

Friday Morning:

June 27 a.m. Basic Physics For Drive System Engineers, Peter Werner, PH Werner Consulting LLC

June 27 a.m. Installation Practices: High Frequency Bonding and Motor Bearings, Pat Link, ASDS Inc.

June 27 a.m. Disturbance Analysis and Troubleshooting, *Mark Weaver, 3 Quarks Engineering*

June 27 Noon Course Ends



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TAPPI Drives Short Course Biographies
**Thursday & Friday, 22 & 23 June 2017, presented in conjunction
with the IEEE Pulp, Paper & Forest Industries Technical Conference**



Thomas O. Trueb P.E., President – efiSolutions, Inc; formerly Chief Engineer and Co-Founder of Dean Oliver & Associates. Tom has over 40 years of paper industry experience as a paper mill project engineer, superintendent and engineering supervisor with Charmin Paper and later Union Camp followed by industry consulting experience with Simons-Eastern and Dean Oliver. Tom has authored several technical papers and has expertise in application of drives for extended nip presses, high intensity presses, multiwire fourdriniers, multiple headboxes and fan pumps, as well as paper machine dry end sections, coaters, embossers, rewinders, reelers and finishing winders. Tom has assumed leadership roles in TAPPI and other industry organizations culminating in TAPPI's EE Committee Chairman and PCE&I Division Chairman. Tom is the co-founder of the TAPPI Drives Short Course and has been involved as an instructor for the past 25 years. Tom also is experienced at restoring plant electrical systems from the effects of floods, hurricanes and fires.



Michael S. Highsmith, Senior Project Engineer – Rockwell Automation, Systems and Solutions Business. Mike has over 28 years of experience in the pulp and paper industry serving as a commissioning engineer and then moving into system design engineering with Rockwell Automation. Mike is involved with the drive system hardware, drive system software, and drive system commissioning engineering of numerous paper machines, winders, and off machine coaters. Mike has expertise in drive web handling control methods, drive tuning, and outer loop web handling tuning.



Mark D. Weaver P.E., Principal, 3Quarks Engineering PLLC. Mark has over 40 years of experience in the pulp and paper industry working as a specialist in Adjustable Speed Drive (ASD) applications, power generation and power distribution. Mark has been responsible for engineering, construction, commissioning and startup of numerous paper machines/paper machine drives, winders/winder drive systems and turbo-generators with an emphasis on winder control systems. Mark has been active in the IEEE Pulp & Paper committee and served as the Publications Chairman for the Industry Applications Society of IEEE. Mark has served on the faculty of the TAPPI Paper Machine Drives Short Course since 1983.



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TAPPI Drives Short Course Biographies (cont'd)



Pete Werner PE, Retired Prior: Senior Principal Engineer-Rockwell Automation; VP Controls-World Wide Converting; Engineering Specialist-3M Co; Drive Systems Engineer-Black Clawson Co; Aircraft Electrician-USMC. Fifty plus years engaged in electrical controls and solutions. Recognitions: 3M Model V Drive; Two Winding patents; RA/OSU Web Handling Rep; IEEE Meritorious Engineering. Forty-plus years designing, and analyzing multiple forms of DC and AC drives and systems applied to: Pulp and Paper Manufacturing; Paper Film and Foil Converting; Winding and Unwinding; Web Handling and Strip Tension Control; Metered and Zero-Tension Winding/Unwinding. Engineered large-scale Electric Vehicles. Active member of IEEE-Pulp and Paper Society and prior of TAPPI. Past facilitator and faculty of TAPPI Paper Machine Drives Short Course.



Patrick J. Link P.E., President, Adjustable Speed Drive Services Inc. Pat has over 30 years of paper industry drives experience with specific expertise in the installation, repair and troubleshooting of AC and DC drives and drives systems for paper machines. He is one of North America's leading experts in the detection and remedies of "fluted" bearing failures of motors operated by drives, and has authored several technical papers on this subject. Pat has served as an active member of the TAPPI Motors, Controls & Drives subcommittee of the PCE&I Division, as well as the Drives Controls and Systems subcommittee of the IEEE Pulp & Paper Industry Applications Society. He has served as an instructor of the TAPPI Drives Short Course for the past 20 years.



Burton M. Judson Jr., Retired Prior: Senior Application Engineer, Global Drive Systems for Rockwell Automation. Burt began his career with Reliance Electric in 1961, and in fact started as part of the Paper Group at that time. He retired after 53 years with Reliance/Rockwell. Now some 56 years later, Burt is still very active in developing and marketing Drive Systems to the Paper Industry. He is an active member of TAPPI and the IEEE Pulp and Paper Industry Committee, serving in many positions of leadership in both groups. He has authored and presented many technical papers at those conferences as well as the Canadian Pulp & Paper Association. His experience includes many new and rebuilt paper machines, winders and off-machine coaters. While not a presenter at this year's Drives Short Course, he was active in organizing it and coordinating the efforts to present it during this year's IEEE P & P Conference.



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TAPPI Drives Short Course Biographies (cont'd)



Robert F. Van Lieshout, Engineering Manager, Forest Products, Converting and Print Industries – Rockwell Automation, Systems and Solutions business. Bob has over 33 years of experience in the pulp and paper industry serving as a Product Line Engineer for the Beloit Corp and later moving into system design engineering and project management roles with Drive Systems suppliers ABB and Rockwell Automation. Bob has been involved with the engineering and commissioning of numerous paper machines/paper machine drives, winders/winder drive systems and off machine coaters. He is active member in IEEE and has held a number of committee roles in TAPPI.