

2010

Modern Bearing Technology Continuing Education



PRESENTED BY THE AMERICAN BEARING MANUFACTURES ASSOCIATION


American Bearing Manufacturers Association **ABMA**



CHAIRMAN'S INTRODUCTION



ABMA is entering a new chapter in the evolution of our Continuing Education Program by building on a solid foundation and reputation with refreshed curriculums for 2010 and new program offerings in the coming years.

For the past sixteen years, ABMA has been educating on the essentials of bearing technology and offering engineers advanced training opportunities to succeed. The ABMA Continuing Education Program is the industry leader in bearing technology education, training over 1,500 managers and engineers in or related to the bearing industry and we are proud of this track record.

ABMA courses are targeted to meet the needs of those working with bearings; whether as a manufacturer, supplier, distributor or end-user and seamlessly weave bearing theory with real world application, thus providing course participants with an enhanced skill set and expanded industry knowledge.

Our course instructors have a direct link to the bearing industry and understand today's technological advances and trends, bringing their real world expertise to the classroom. Daniel Snyder has taken the reigns as content lead and head instructor for the courses. Dan brings over 45 years of experience in the bearing industry and recently retired from a long career at SKF USA Inc. He is joined by Michael Kotzalas, a Chief Engineer at the Timken Company who has authored more than twelve publications, including co-authoring Rolling Bearing Analysis 5th Edition with Tedric Harris. Dan and Mike have been instructors in the ABMA program for many years and active technical experts for the association. Their collective expertise along with our additional instructors, from both educational and technical perspectives, provides course participants with a well-rounded and directly applicable curriculum in an interactive learning environment.

As we look to the future, we must recognize the work and dedication of Ted Harris, who played an integral role in the creation of the ABMA education program and was the lead instructor since inception. Ted's enthusiasm and energy led this program to many successes, a legacy that will continue to be embraced.

ABMA is ready to take our education program to new heights and we look forward to your involvement.

Les Miller
Engineering Education Committee Chairman
Vice President of Engineering
Kaydon Bearings Division



COURSE SCHEDULE

ESSENTIAL CONCEPTS OF BEARING TECHNOLOGY

September 29-October 1, 2010
The Hyatt Lodge at McDonald's Campus
Oak Brook, IL

ADVANCED CONCEPTS OF BEARING TECHNOLOGY

October 26-29, 2010
Hilton Charlotte University Place
Charlotte, NC

LUBRICATION AND WEAR: ADVANCED CONCEPTS

November 15-17, 2010
University of Notre Dame
South Bend, IN





COURSE DESCRIPTIONS

Essential Concepts of Bearing Technology

DATES: September 29-October 1, 2010

BEGINS: 8:00 a.m. September 29

ENDS: 5:00 p.m. October 1

LOCATION: The Hyatt Lodge at McDonald's

Campus, Oak Brook, IL

TOPICS COVERED:

- Basic Concepts of Tribological Design
- History of Tribology and the Bearing Industry
- Rolling Bearing Types, Applications & Macrogeometry
- External & Internal Dimensional Standards
- Bearing Loads in Applications: Static Loading
- Basic Component Manufacturing Methods
- Bearing Loads In Applications: Dynamic Loading
- Mounting Methods: Shaft & Housing Fits
- Ball & Roller Loading
- Contact Stresses-Surface & Subsurface
- Bearing Load Sharing & Internal Loading
- Materials for Ball & Roller Bearings
- Introduction to Concepts in Friction, Lubrication & Wear
- Ball & Roller Bearing Deflections & Stiffness
- Lubrication Methods & Bearing Maintenance
- Failure Modes in Rolling Bearings
- Bearing Life-Standard & Catalog Calculation Methods

This course includes a copy of the book *Rolling Bearing Analysis, Essential Concepts of Bearing Technology, 5th Edition* by Ted Harris and Mike Kotzalas (Taylor & Francis, CRCpress 2006).

FACULTY: Industry Experts Dan Snyder and Mike Kotzalas, and Professor Tim Ovaert.

WHO SHOULD TAKE THIS COURSE? This course is designed for engineers and others with technical backgrounds that have limited exposure to bearings and need to either adapt their technical training to bearings or seek to upgrade their technical knowledge. The course curriculum includes quantitative and conceptual materials. Attendees receive 2 CEU's upon successful completion of this course.

COURSE FEES:

Member: \$1,475

Non-Member: \$1,725



COURSE DESCRIPTIONS

Advanced Concepts of Bearing Technology

DATES: October 26-29, 2010
BEGINS: 8:00 a.m. October 26
ENDS: 12:00 p.m. October 29

LOCATION: Hilton Charlotte University Place,
Charlotte, NC

TOPICS COVERED:

- Bearing Macrogeometry: Clearance, Free Contact Angle, Press Fitting
- Ball/Roller Loading: Static/Inertial
- Contact Stresses, Deflection, & Subsurface Stresses
- Internal Load Distribution
- Internal Speeds & Motions: Rolling, Sliding, Spinning
- Internal Load Distribution - High Speed
- EHD- & Micro-EHD Lubrication
- Concepts of Friction & Wear
- Statistical Analysis Methods
- Tolerances, Metrology, & Surface Topography
- Contact Friction
- Bearing Friction & Temperature
- Failure Modes
- Permanent Deformations & Static Capacity
- Vibration, Noise & Condition Monitoring
- Fatigue Life Prediction: Standard & Catalog Methods; Testing Methods; and Fatigue Limit Stress Methods
- Lubricants & Rheology
- Shaft-Bearing Systems & Performance Analysis Computer Programs

Advanced course provides greater emphasis on examples to reinforce the technology and methods of calculation used to predict rolling bearing performance.

This course includes a copy of the book *Rolling Bearing Analysis, Advanced Concepts of Bearing Technology, 5th Edition* by Ted Harris and Mike Kotzalas (Taylor & Francis, CRCpress 2006).

FACULTY: Industry Experts Dan Snyder and Mike Kotzalas, and Professor Tim Ovaert.

WHO SHOULD TAKE THIS COURSE? Individuals with a B.S. in engineering or a related discipline and either attendance at ABMA's Essential Concepts of Bearing Technology course or 2-3 years work experience in the bearing or related industries. Attendees receive 3.2 CEU's upon successful completion of this course.

COURSE FEES:
Member: \$1,875
Non-Member: \$2,225



COURSE DESCRIPTIONS

Lubrication and Wear: Advanced Concepts

DATES: November 15-17, 2010

BEGINS: 1:00 p.m. November 15

ENDS: 4:00 p.m. November 17

LOCATION: University of Notre Dame,
South Bend, IN

TOPICS COVERED:

- Introduction to Lubrication and Wear
- Regimes of Lubrication
- 2-D Surface Topographical Characterization
- 3-D Surface Topographical Characterization
- 2-D (Line) and 3-D (Point) Contact Mechanics
- 2-D and 3-D Hertzian Contact Mechanics
- Surface and Subsurface Stress Analysis
- Asperity Contact Models
- Coated Surfaces
- 2-D Elastohydrodynamic Lubrication (EHL)
- 3-D EHL
- Surface Roughness Effects in EHL
- Temperature Effects in EHL
- Lubricant Starvation Effects in EHL
- Transient EHL
- Micro-EHL
- Mixed Lubrication
- Grease Lubrication, Grease Additives
- Sliding Friction
- Rolling Element Bearing Friction Torque
- Sliding Wear Models
- Fatigue Wear Models
- Debris Accommodation

- Coating Failure
- Small-Scale Phenomena
- Boundary Lubrication
- Nano-tribology
- Current and Future Research Thrusts

FACULTY: Professor Tim Ovaert

WHO SHOULD TAKE THIS COURSE? This course is designed for engineers and scientists in the rolling element bearing and power transmission industries who desire a more fundamental knowledge of the lubrication, friction and wear sciences. The course introduces individuals to the relevant phenomena pertaining to surface topography measurement and analysis, analyzing surfaces in contact, lubrication films, and friction appropriate to rolling element bearings, sliding machine elements, and mechanical systems. The course bridges the gap between component design and component failure as a result of relative motion between surfaces in contact. Attendees receive a certificate upon successful completion of this course.

COURSE FEES:

Member: \$1,275

Non-Member: \$1,525



2010 COURSE FACULTY

Michael N. Kotzalas, Chief Engineer Product Design - Global TRB, The Timken Company. Mike Kotzalas holds BS, MS and PhD degrees in Mechanical Engineering from Penn State University. Since graduation in 1999, he has been employed in Product Development and Customer Engineering at The Timken Company in Canton, Ohio. Mike is an active member of technical societies, currently serving on the Executive Committee for the ASME Tribology Division. He is the author of more than 12 publications, co-author of *Rolling Bearing Analysis 5th Edition*, holds two patents on rolling bearings and has received the 2001 Best Paper Award from the ASME Tribology Division, the 2003 and 2006 STLE Hodson Award and the 2007 SAE Off-Highway Outstanding Young Engineer Award.

Timothy C. Ovaert, Professor of Mechanical Engineering- University of Notre Dame. Tim Ovaert received his BS degree in Mechanical Engineering from the University of Illinois-Urbana and his Master of Engineering Management and PhD in Mechanical Engineering from Northwestern University. His industry experience includes serving as Plant Engineer at the DuraBar Division of Wells Manufacturing Company. Previously, he was Professor of Mechanical Engineering at Penn State.

In addition to teaching mechanical engineering design, reliability engineering, and tribology, he conducts research on materials characterization, materials for tribological applications, and manufacturing. He has served as a technical consultant to more than twenty-five medium to Fortune 100 companies. He was named a National Young Investigator by the National Science Foundation, and is the recipient of the Ralph R. Teetor Award from the Society of Automotive Engineers, and the Burt L. Newkirk Award from the American Society of Mechanical Engineers (ASME). Ovaert has served as an associate editor for the *ASME Trans., Journal of Tribology*, and as the Chair of the ASME/STLE International Joint Tribology Conference. He is the author and/or co-author of over 80 technical publications, and is a Fellow of the ASME.



Dan Snyder, Former Director of Application Engineering for SKF USA Inc's Industrial and Service Divisions. Mr. Snyder is a Registered Professional Engineer with over forty five years of experience in the bearings and related components and services fields. He has extensive experience in the areas of design, application, life analysis, lubrication, testing and failure analysis of rolling element bearings. Mr. Snyder is the author of various technical publications and industry trade publication articles. He has worked on various ISO Working Groups for rolling bearings and currently is a member of the ABMA Bearing Technical and the Education Committees. He is also a member of the American Society of Mechanical Engineers and the Society of Tribology and Lubrication Engineers. Mr. Snyder continues to consult with SKF and is President of his own consulting business, Bearing and Lubes Consulting, LLC.



ACCOMMODATIONS INFORMATION

Housing costs are not included in course fees and participants are responsible for making their own housing arrangements. Please identify yourself as an ABMA course participant when making reservations in order to receive the discounted ABMA room-rate. Reservation cut-off dates for each course is listed below. Please secure reservations by the deadline listed to ensure availability of rooms. After these dates ABMA cannot guarantee hotel availability or the special ABMA group rate.

ESSENTIAL CONCEPTS OF BEARING TECHNOLOGY

COURSE LOCATION AND ACCOMMODATIONS

This course will be held at The Hyatt Lodge at McDonald's Campus in Oak Brook, IL.

A block of rooms has been reserved for course participants for the evenings of September 28-30th. The special ABMA rate is \$155 single/double occupancy, plus hotel occupancy tax. **Participants must make lodging arrangements 30 days prior to the course in order to be guaranteed housing.** After this date ABMA cannot guarantee availability or the ABMA special rate.

To make reservations, please refer to the below phone number and indicate that you are attending ABMA's Essentials Course. As a reminder, all course attendees are responsible for booking their own hotel room.

The Hyatt Lodge at McDonald's Campus
2815 Jorie Boulevard
Oak Brook, Illinois 60523
Phone: (630)568-1234

TRANSPORTATION

From O'Hare International Airport (11 miles- Approx. \$30.00 Cab Ride):

Take the Tri-State Tollway (I-294) South. Exit onto I-88 West. Pay one toll. Travel 1 mile on I-88 West and exit onto Route 83 South. Proceed to exit on 31st Street. At the light, turn left onto 31st Street. Continue to Jorie Blvd. Turn Left onto Jorie Blvd. At second stop light, turn right onto Ronald Lane. At the first stop sign, turn left. Hotel is on the left and parking is on the right.

From Midway Airport (15 miles- Approx. \$35.00 Cab Ride):

Take I-55 South to I-294 North. Proceed north, exiting onto I-88 West. Pay one toll. Travel 1 mile on I-88 West and exit onto Route 83 South. Proceed to exit on 31st Street. At the light, turn left onto 31st Street. Continue to Jorie Blvd. Turn Left onto Jorie Blvd. At second stop light, turn right onto Ronald Lane. At the first stop sign, turn left. Hotel is on the left and parking is on the right.

Once on McDonald's Campus, all signage for the hotel states 'The Lodge'; there are no signs indicating Hyatt outside the hotel.

ADVANCED CONCEPTS OF BEARING TECHNOLOGY

COURSE LOCATION AND ACCOMMODATIONS

This course will be held at the Hilton Charlotte University Place in Charlotte, NC.

A block of rooms has been reserved for course participants for the evenings of October 25-28th. The special ABMA rate is \$149 single/double occupancy, plus hotel occupancy tax. Participants must make lodging arrangements 30 days prior to the course in order to be guaranteed housing. After this date ABMA cannot guarantee availability or the ABMA special rate.



ACCOMMODATIONS INFORMATION

To make reservations, please refer to the below phone number and indicate that you are attending ABMA's Advanced Course. As a reminder, all course attendees are responsible for booking their own hotel room.

Hilton Charlotte University Place
8629 JM Keynes Drive
Charlotte, NC 28262
Phone: (704)547-7444

TRANSPORTATION

From Charlotte/Douglas International Airport (15 Miles- Approx. \$40.00 Cab Ride):

Exit from I-85 North to exit 45A, W.T. Harris Boulevard East. Hilton Charlotte University Place is 1/4 mile on the left in the University Place complex. The hotel is the high rise building in the complex, totally visible from Harris Boulevard. The left turn at J M Keynes Drive goes directly into the hotel parking lot.

LUBRICATION & WEAR: ADVANCED CONCEPTS

COURSE LOCATION AND ACCOMMODATIONS

This course will be held at the Center for Continuing Education Building in room 210-214 on the Notre Dame campus.

A block of rooms has been reserved at the Morris Inn across Notre Dame Avenue from the Continuing Education Building at the University of Notre Dame for the evenings of November 14-16th. The special ABMA rates are \$149.16 for single occupancy and \$172.76 for double occupancy including tax. **Participants must make lodging arrangements at least 30 days prior to the start of the course in order to be guaranteed housing.**

To make reservations, please refer to the below phone number and indicate that you are attending ABMA's Lube & Wear Course. Parking at the Morris Inn is free for registered guests. As a reminder, all course attendees are responsible for booking their own hotel room.

The Morris Inn
Notre Dame Avenue
Notre Dame, IN 46556
Phone: (574) 631-2000

An alternate option for lodging is The Inn at St. Mary's, (574) 232-4000, located less than a mile from Notre Dame. The Inn at St. Mary's offers scheduled shuttle service to and from Notre Dame's campus. <http://www.innatsaintmarys.com>.

TRANSPORTATION

Airline service to South Bend's Regional Airport (SBN) is provided primarily by commuter lines of major air carriers through Chicago O'Hare (United), Detroit (Northwest), Cincinnati (Delta), Atlanta (Delta), Cleveland (Continental), Minneapolis/St. Paul (Northwest), Las Vegas (Allegiant), and St. Petersburg, FL (Allegiant).

The campus is easily accessible from the airport by a short taxi ride. Frequent limousine service is also available directly to the campus from Chicago's O'Hare and Midway Airports via Coach USA (800-833-5000 or www.busville.com).

South Bend is also served by the interurban South Shore Railroad from downtown Chicago and by AMTRAK trains, east and west, daily.

If you are driving, Notre Dame is located in South Bend, Indiana, about 90 miles east of Chicago, near the Indiana Toll Road (Interstate 80/90). Exit 77 (Notre Dame) is 1 mile from campus.



ON-SITE INFORMATION

ON-SITE INFORMATION

All course fees include breakfast, lunch and breaks. Dinner will be on your own. Numerous food options are within walking distance of all course locations.

COURSE CONFIRMATIONS

Before the start of the course, ABMA will send confirmation via e-mail verifying receipt of your registration and confirming your participation in the program. For the Essentials Course, required pre-course work will be sent to you upon registration. All course books & materials will be distributed on-site.

CREDIT CARD TRANSACTIONS

Before charging the registration amount to your or your company's credit card, please verify if there is a limit on the card that restricts large purchases as to avoid your card being declined. If there is a limit, please indicate that you would like the charge to be broken up into two separate transactions, so that we may process your registration in a timely manner.

SUBSTITUTION AND CANCELLATION POLICY

Substitutions for registrants unable to attend will be accepted any time prior to the beginning of the course. We do ask however, that any course-related materials already received by the registrant be forwarded to the substitute attendee.

Cancellations received 60 days prior to the course start date will receive a full refund. Cancellations received between 30 days and 60 days from the start of the course will receive a 50% refund. There are no refunds for cancellations within 30 days of course start date. **Again, substitutions are welcome and strongly recommended.**

REGISTRATION FORM

Please use a separate form for each attendee

NAME		TITLE	
COMPANY			
ADDRESS			
CITY	STATE	ZIP	
PHONE	FAX	EMAIL	

ESSENTIAL CONCEPTS OF BEARING TECHNOLOGY

September 29 - October 1, 2010 – Chicago, IL

Early Registration Member: \$1,350.00 Non-Member: \$1,575.00

Regular Registration Member: \$1,475.00 Non-Member: \$1,725.00

ADVANCED CONCEPTS OF BEARING TECHNOLOGY

October 26-29, 2010 – Charlotte, NC

Early Registration Member: \$1,685.00 Non-Member: \$2,000.00

Regular Registration Member: \$1,875.00 Non-Member: \$2,225.00

LUBRICATION AND WEAR: ADVANCED CONCEPTS

November 15-17, 2010 – South Bend, IN

Early Registration Member: \$1,150.00 Non-Member: \$1,375.00

Regular Registration Member: \$1,275.00 Non-Member: \$1,525.00

EARLY REGISTRATION DISCOUNT

Early Bird Discount

Register at least 45 days prior to the start of the courses you choose and enjoy a 10% discount on registration fees.

Essential Concepts

Register by August 15

Advanced Concepts

Register by September 13

Lubrication and Wear Concepts

Register by October 1

METHOD OF PAYMENT

Check Visa MasterCard American Express Discover

NAME OF CARDHOLDER

CARD NUMBER

EXPIRATION DATE

TOTAL \$ _____

COMPANY MEMBER OF ABMA: YES NO

REGISTRATION IS BASED ON A FIRST-COME, FIRST-SERVED BASIS BASED ON AVAILABILITY. REGISTRATION FEE INCLUDES CLASS SESSION, COURSE MATERIALS, AND FOOD FUNCTIONS.

MAIL: Mail your registration & payment to: ABMA, 2025 M St. NW, Suite 800, Washington, DC 20036.

FAX: Fax your registration and credit card information to ABMA at (202) 367-2155.

EMAIL: Scan and email your form to info@americanbearings.org.

SUBSTITUTION AND CANCELLATION POLICY

Substitutions for registrants unable to attend will be accepted any time prior to the beginning of the course. We do ask however, that any course-related materials already received by the registrant be forwarded to the substitute attendee. **Substitutions must be submitted in writing to ABMA.** Cancellations received 60 days prior course start date will receive a full refund. Cancellations received between 30 days and 60 days from the start of the course will receive a 50% refund. There are no refunds for cancellations within 30 days of course start date. **Again substitutions are welcome and strongly recommended.**

HOTEL POLICY

Participants must make their lodging arrangements at least 30 days prior to the start of the course in order to ensure that rooms are available at the contracted rate.

For further information, contact ABMA at (202) 367-1155 or at info@americanbearings.org.

ABOUT ABMA

The American Bearing Manufacturers Association (ABMA) is a trade association, open to any firm with a substantial part of its business being the manufacture, in the United States, of anti-friction bearings or major components thereof. ABMA actively strives to promote and grow the bearing industry through member programs - conferences, national and international standards, industry statistics and bearing technology courses. ABMA monitors and informs members of global trade issues, regulatory actions and legislative matters impacting the bearing industry's commercial viability. ABMA member companies manufacture over 80% of the bearings produced in the United States. For further information about ABMA visit www.americanbearings.org.

ABMA STANDARDS

American Bearing Manufacturers Association has published a complete set of Standards for anti-friction ball and roller bearings and balls. These Standards were prepared by ABMA's Bearing Technical Committee and have received the approval of the participating companies as well as the American National Standards Institute (ANSI) and/or the International Standards Organization (ISO).

To purchase ABMA standards or for more information, visit us on line at www.americanbearings.org/publications. ABMA standards cover a wide range of bearing types and topics. Our standards encompass, but are not limited to:

Airframe Ball Bearings, Ball bearings, Cylindrical Roller Bearings, Instrument Ball Bearings, Linear Bearings, Radial Bearings, Roller Bearings, Spherical Plain Bearings, Tapered Roller Bearings, Thrust Bearings, Roller Bearing Mounting Accessories, Spherical Roller Bearing, Needle Roller Bearing, Ball Roller Bearing, Cam Bearing Roller, Taper Roller Bearing, Flanged Roller Bearing, Radial Ball Bearings and Roller Thrust Bearing.

Register Today
www.americanbearings.org/education



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Website: www.americanbearings.org