

Achieve SME's Highest Recognition for Precision Grinding and Abrasive Machining Professionals!



Society of
Manufacturing
Engineers

One SME Drive, P.O. Box 930
Dearborn, MI 48121-0930

Precision Grinding & Abrasive Machining Certificate Program

New, SME EXCLUSIVE PROGRAM!

**The only Precision Grinding and
Abrasive Machining Certificate
Program of its kind!**

- Led by an industry-renowned expert
- Test Facility Tour of Dana Corporation!
- FREE Modern Grinding Process Technology book to SME Members! While Supplies Last!
- Earn college credits for attending
- Network with other machining professionals



June 6-8, 2006
Owens Community College
Perrysburg, OH

Class Size is Limited!
Register Now
Call 1-800-733-4763
www.sme.org/certificates



Society of
Manufacturing
Engineers
Certificate
Program Series™



Society of
Manufacturing
Engineers
WHERE MANUFACTURING COMES TOGETHER™

Sponsored by the Society of Manufacturing Engineers in cooperation with the Machining & Material Removal Community

DON'T MISS THIS UNIQUE PROGRAM! Registration is first-come, first-served.



THE 19 CRITICAL SKILL SETS ADDRESSED:

1. The mechanism and theory of the abrasive process
2. Abrasive types and their properties
3. Grinding wheel bond systems
4. How to specify the wheel for the job
5. How to properly mount a grinding wheel
6. How to properly true and dress a grinding wheel
7. Effects of wheel speed
8. Superabrasive grinding
9. Types of grinding fluid
10. The proper application of grinding fluid
11. Understanding surface finish
12. Grinding machine design
13. Understanding the effects of vibration in grinding
14. Material (Grinding is a materials driven process)
15. Surface grinding processes
16. Cylindrical grinding processes
17. Contour grinding processes
18. Trouble-shooting the process
19. Case studies



SME has approved this event for professional education credits toward the SME recertification program. One credit is awarded for each hour of instruction. To learn how certification can help you gain recognition and document your skills and knowledge in manufacturing, please contact the Certification Department at (800) 733-4763.

INVEST YOUR TIME AND MONEY IN A COURSE THAT DOCUMENTS WHAT YOU HAVE LEARNED.

- Content is specialized to your field
- Record your knowledge with pre- and post- program assessments
- Obtain documentation that goes with you, recognizing your knowledge and skills
- Recognition from a leader in manufacturing training, the Society of Manufacturing Engineers
- Group discounts available

ABOUT THE PROGRAM

This new certificate program provides a basic overview of the precision grinding and abrasive machining process with an in-depth look at techniques and practices that are sure to enhance your abrasive operation. You will be shown several processes that could dramatically improve product quality and productivity.

Based on SME's successful Modern Grinding Technology Workshop presented by Dr. Salmon since 1988, this certificate program probes deeper into the technology of grinding to enable you to confidently use and troubleshoot virtually any grinding process in today's modern age.

You will learn how...

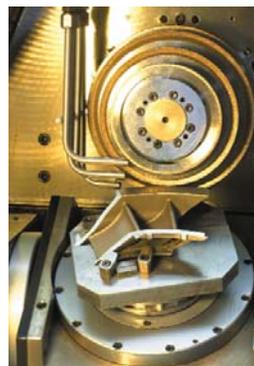
- various abrasives work and their effect on workpiece surface integrity
- to select the correct abrasives for your specific grinding applications
- to properly and consistently true and dress any grinding wheel
- grinding can now displace milling, broaching, and some turning applications
- you can economically machine next generation materials, like ceramics, where abrasives are a must
- a thorough understanding of grinding machine design, including CNC, will allow you to identify both positive and negative aspects of existing machine tools and what to "look for" when purchasing new grinding equipment

WHY EARN A CERTIFICATE?

The purpose of this certificate program is to provide a standard of achievement which will improve your knowledge and understanding of abrasive and grinding processes. By achieving this certificate, you will have documentation of your knowledge that you can take to current and future employers to validate your expertise. This comprehensive professional training will give you the knowledge, skills, study materials and an examination of understanding for the precision grinding process.

SPECIAL OFFER TO SME MEMBERS* (FREE BOOK)

SME members, and attendees who join SME prior to the event, will receive a complimentary copy of *Modern Grinding Process Technology* while supplies last. This book allows the reader to realize the full potential of modern abrasives, troubleshoot existing grinding problems, and purchase and use up-to-date grinding processes and equipment in the new manufacturing environment.



Available only to program registrants

Newly developed comprehensive Precision Grinding binder. You will receive a binder of materials developed specifically for this event. Use this comprehensive document both as a study guide for the exam and a post-program reference tool.

Achieve SME's Highest Recognition for Precision Grinding and Abrasive Machining Certificate Program



Precision Grinding and Abrasive Machining Certificate Program

WHO SHOULD ATTEND?

You! If you are...

- operating or are familiar with grinding machines
- currently using or working with abrasives
- machining next generation materials (composites, ceramics)
- currently milling or broaching
- thinking of purchasing a milling, broaching, or grinding machine
- looking to build on a working knowledge of basic grinding technology

SCHEDULE AT-A-GLANCE

DAY 1, TUESDAY, JUNE 6, 2006

Registration: 8:00 a.m. – 8:30 a.m.
Program Hours: 8:30 a.m. – 4:00 p.m.
Group Lunch: Noon - 1:00 p.m.

DAY 2, WEDNESDAY, JUNE 7, 2006

Program Hours: 8:30 a.m. - 4:30 p.m.
Group Lunch: Noon - 1:00 p.m.
Tour of Dana Corporation: 1:00 – 4:00pm
(Includes travel time)

DAY 3, THURSDAY, JUNE 8, 2006

Program Hours: 8:30 a.m. - 2:00 p.m.
Group Lunch: Noon - 1:00 p.m.
Post Test: 1:00 p.m. - 2:00 p.m.
Participants not taking the exam may depart at 1:00pm.

Registration Fees: \$1395 SME Member, \$1595 Nonmember

Course materials and study guide will be provided to paid attendees.

Complimentary danish and coffee in the morning, group lunch and an afternoon refreshment break will be provided each day. SME is pleased to provide you with a smoke-free classroom.

Registration deadline: June 4, 2006

Pre-payment is required.

Questions? Call Kathleen Mennillo, Product Development Manager, at (313) 425-3112 or e-mail to kmennillo@sme.org

KEY FEATURES

LIVE DEMONSTRATIONS

An instrumented grinding machine will be used to show the rights and wrongs of dressing a grinding wheel, using both single point diamonds and rotary diamond roll dressers. High speed grinding will be demonstrated showing the effects on surface finish and power up to 18,000sfm (90m/s) using plated cBN. The proper application of the fluid will be shown in a creep-feed grinding operation. No video, no cartoons – the real thing!



PLANT TOUR

Dana Corporation, Ottawa Lake, MI

Dana employees design and manufacture products for every major vehicle producer in the world. A leading supplier of axle, driveshaft, engine, frame, chassis, and transmission technologies, Dana employs 46,000 people in 28 countries. The company is based in Toledo, Ohio and reported sales of \$9.1 billion in 2004.

Dana's designers, engineers, and technical experts are increasingly involved with the design and development of modules and systems, such as power steering/water pump modules and independent rear suspension systems. This includes full CAD responsibility, prototyping, and durability and program testing.

This *special tour* of the Dana test track will include a bus ride on the track and the opportunity to view materials, rapid prototyping, electronic controls, and mechanical testing. Bus transportation will be provided to and from the plant tour.



NOTE: All workshop participants are subject to final approval by the host facility, which reserves the right to PRESCREEN and DECLINE attendance for the tour. No cameras allowed.



PROGRAM OUTLINE

INTRODUCTIONS

- Meet your course instructor
- Meet your fellow attendees

PRE-EXAM

1. The Mechanism and theory of the abrasive process

- Micro-milling analogy
- Arc length of cut considerations
- Relationship of forces and power in grinding
- Partition of energy
- Terminology

2. Abrasive types and their properties

- Aluminum Oxide
- Silicon Carbide
- Cubic Boron Nitride
- Diamond

3. Grinding wheel bond systems

- Coatings used in grinding

4. How to specify the wheel for the job

- Considerations of material, machine and quantity and cost
- Specifying a conventional abrasive wheel
- Specifying a superabrasive wheel
- G Ratio

5. How to properly mount a grinding wheel

- Grinding wheel safety
- Methods used to balance a grinding wheel

6. How to properly true and dress a grinding wheel

- Single and multi-point systems
- Rotary diamond systems
- Wafer roll systems

7. Effects of wheel speed

- Calculating wheel speed and grinding speed
- High-speed grinding - Pros and cons

8. Superabrasive grinding

- Special considerations when using superabrasives
- Interactions with material and fluid

9. Types of grinding fluid

- Cooling and lubricating
- Chemical interactions in grinding
- How to choose and specify a fluid
- Fluid filtration
- Safe use of grinding fluids

10. The proper application of grinding fluid

- Nozzle design and proper placement
- Jet cleaning nozzles and placement
- Fluid failure mechanisms

11. Understanding surface finish

- Surface finish measurement
- Surface integrity issues

12. Grinding machine design

- Today's designs - Pros and cons
- Future machine design concepts
- Rigidity and damping
- Vibrational stability
- CNC controls

13. Understanding the effects of vibration in grinding

- Chatter
- Regenerative chatter

14. Material (Grinding is a materials driven process)

- Grinding ferrous metals
- Grinding non-ferrous metals
- Grinding non-metals

15. Surface grinding processes

- Reciprocating
- Speed-feed grinding
- Creep-feed grinding
- Double-disk grinding

16. Cylindrical grinding processes

- D and OD grinding
- Centerless grinding

17. Contour grinding processes

- Jig grinding
- Cam grinding

18. Troubleshooting the process

- Mechanically influenced problems
- Thermally influenced problems
- Electrically influenced problems

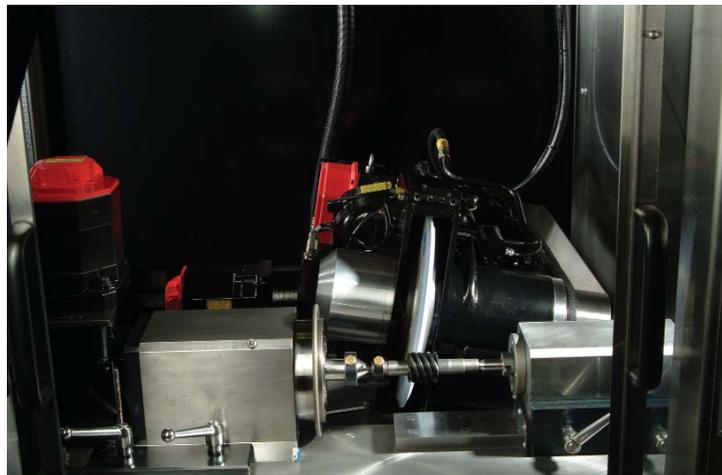
Case studies

Throughout the program, case studies will be used to illustrate "real-world" situations. This particular emphasis on the "real-world" makes the application of the principles and practices being cover more applicable to the shop floor, making direct impact on productivity upon the attendees return to the workplace.

Review

(Question and Answer session)

Post-Exam



TAKING THE EXAM?

Course materials and study guide will be provided to paid attendees at registration.

SUCCESSFUL CANDIDATES RECEIVE:

- SME Certificate of Completion
- SME Letter of Reference

ABOUT THE EXAM

This certificate program provides an optional **multiple choice** pre- and post-program assessment to document your proven skill, knowledge and information gains.

COURSE INSTRUCTOR

Stuart C. Salmon, Ph.D., is president of Advanced Manufacturing Science and Technology, Inc., an independent consulting firm in Ohio. He is known worldwide as the chief contributor to the research and development of the revolutionary Continuous-Dress Creep-Feed grinding technique. Dr. Salmon took his apprenticeship from and was sponsored for his grinding research by Rolls Royce Aero Engine Division in England. He wrote the Abrasive Machining Handbook for the grinding division of Körber AG in Germany and has written numerous papers and articles as well as contributing to the McGraw-Hill Encyclopedia of Science and Technology. Dr. Salmon holds patents on fixture and sensor designs essential to the success of automated grinding operations as well as patents on a revolutionary new concept in grinding machine tool design and next generation grinding wheels, presently under development. He spends the majority of his time in independent engineering consultation activities with companies throughout the world designing, researching, developing and troubleshooting abrasive processes and grinding systems.



ADDITIONAL RESOURCES AVAILABLE AT SME!

SME's NEW Machining & Material Removal Community: focuses on the technologies and processes that help professionals advance their skills and knowledge in machining technologies. This community and its technical groups provide members with opportunities to learn about the latest advances and share best practices with others in their field, especially those who share interests in specific technologies like abrasive cutting processes, cutting tools, metalworking fluids, machining processes & systems, and machining alternative uses.

Join SME when you register and save! If you're not already an SME member, you'll want to join today so you can immediately take advantage of the Machining & Material Removal Community benefits including heavy discounts on books, videos, and your registration on this event. Use the attached registration form to activate your membership and sign up for the event at the member discount rate.

SME Video Programs:

Basics of Grinding,

VHS: VT95PUB4-4760, DVD: DV03PUB5-4760,

CD-ROM: CD00PUB9

Gears and Gear Manufacturing,

VHS: VT02PUB4, DVD: DV03PUB29

Visit www.sme.org for further program details.

For more information call (800) 733-4763

EVENT LOCATION AND LODGING

Owens Community College

Phone: (419) 661-7000

Industrial Engineering Technologies Building, **Room 109**

30335 Oregon Road

Perrysburg, OH 43551

The Owens Community College Toledo-area Campus (Interstate-75 at Exit 78) covers more than 280 acres and is located just five minutes from downtown Toledo.

This program will be hosted in the Industrial and Engineering Technologies Building, room 109.

Suggested Hotels:

Holiday Inn French Quarter

10630 Fremont Pike

Perrysburg, OH 43551

Phone: (419) 874-3111

This facility has shuttle service to & from the Toledo airport and Owens Community College. The hotel shuttle will run at designated times to the college. Call hotel for details.

Unique New Orleans style French Quarter decor with two Holidomes. Conveniently located off I-75 exit 73 just minutes from the Ohio Turnpike and downtown Toledo. Executive concierge floor with a private lounge featuring breakfast bar and evening hors d'oeuvres daily. 2 holidomes with 3 pools, jacuzzi, sauna, pool tables, ping pong, and 9 hole putting green. 24 business and Fitness Center, Gift Shop, J Patricks Pub & Restaurant with live music Tuesday-Saturday. Free wireless internet throughout the hotel.

Are you looking for training to be brought into your plant? To inquire please call Kathleen Mennillo, Product Development Manager at 313-425-3112.

Precision Grinding & Abrasive Machining Certificate Program

June 6-8, 2006, Owens Community College, Perrysburg, OH

Become a member today and save more than \$100 on registration!

Plus, by joining SME today, you will receive the *Modern Grinding Process Technology* book FREE.

(valued at \$75) For member benefits information, visit www.sme.org

• Free book will be available on-site the first day of the event.

FOUR EASY WAYS TO REGISTER

FAX: (313) 425-3401

MAIL: SME
P.O. BOX 6028
Dearborn, MI 48121-6028

PHONE: (800) 733-4763 (8 am - 5 pm ET,
Monday thru Friday)

ONLINE: www.sme.org/certificates

Enter Priority Code: _____ (look above your name on the mail panel)

Attendee

1 NAME _____ Member # _____

Title _____ Email _____

YES I am joining SME today.

2 NAME _____ Member # _____

Title _____ Email _____

YES I am joining SME today.

3 NAME _____ Member # _____

Title _____ Email _____

YES I am joining SME today.

COMPANY _____ DIVISION _____

MAILING ADDRESS _____

P.O. BOX, MAIL STOP _____

CITY _____ STATE _____ ZIP _____

COUNTRY _____

PHONE _____ FAX _____

SEND THREE AND SAVE!

Choose <input type="checkbox"/> 1, <input type="checkbox"/> 2, or <input type="checkbox"/> 3 SME membership(s) @ \$125 per person.	\$125	X	\$
	SME Member	Nonmember	
<input type="checkbox"/> Precision Grinding & Abrasive Machining Certificate Program CP06REG6 June 6-8, 2006 • Owens Community College, Perrysburg, Ohio	\$1,395	\$1,595	
<input type="checkbox"/> Send 3 from your company SAVE over \$200 per person • CP06REG6 If you have more than 3, call Kathleen Mennillo (313) 425-3112	\$1,185 per person	\$1,355 per person	\$ 3 persons
*SME membership (Note: The membership fee must be paid in advance of the event to qualify for the discounted rate. Invoices and purchase orders are not accepted as payment)	Total \$		

Method of Payment Payment enclosed Credit card registration, please complete this section

Signature _____

Card# _____ - _____ - _____ - _____

Exp. Date _____



PLACE "X" IN BOX OF YOUR CHOICE:

Visa Discover AmExpress MasterCard

Select your ONE primary job function:

- 1 Job Shop Owner
- 2 Company Management/Corporate Executive
- 3 Manufacturing Production
- 3a Mfg./Operations Management
- 3b Foreman/Leader/Supervisor
- 3c Machinist/Machine Operator
- 3d Tool/Die/Mold Maker
- 4 Manufacturing Engineering
- 5 Quality Management
- 6 Product Design/Development
- 7 CNC Programmer/Engineer
- 8 Purchasing
- 10 Other

REGISTRATION FORM

TO ATTEND: Complete the registration form and MAIL to SME P.O. Box 6028, Dearborn, MI 48121-6028, FAX the form to (313) 425-3401 or call SME Customer Service at (800) 733-4763, 8 a.m. to 5 p.m. MAIL REGISTRATIONS AT LEAST TWO WEEKS PRIOR TO EVENT.

Attendance may be limited and only preregistered, prepaid registrants will be guaranteed access to the event. All registrations made less than two weeks prior to the event should be made by telephone. Upon receipt of your registration, SME will send a registration confirmation.

ON-SITE REGISTRANTS, with payment, will be admitted on a space-available basis. **On-site registrants will be charged an additional \$50 administration fee.**

CANCELLATIONS: Cancellations will receive a full refund on or before May 23, 2006. Beginning May 24, 2006 a fifty percent service fee will be deducted from refunds. You must obtain a cancellation number from our registrar to verify cancellations. Confirmed registrants who fail to notify SME of a cancellation prior to the program start date are subject to the full fee.

METHOD OF PAYMENT: All checks should be made payable to SME in U.S. funds. SME accepts VISA, MasterCard, Discover or American Express credit cards. If payment has not been received prior to the program date, you will be asked to guarantee payment against a credit card or provide a company or personal check, money order, or traveler's checks.

PROGRAM CHANGES: SME has the right to amend this program as necessary. In the event of a program cancellation, SME is not responsible for incidental costs incurred by registrants. **It is recommended that refundable airline tickets be purchased.**

DISABLED PERSONS ACCOMMODATIONS: SME is committed to providing reasonable accommodations to persons with disabilities who require such accommodation in order to fully participate in SME-sponsored events. Please contact SME Customer Service at (800) 733-4763 at least two weeks prior to the event, if possible. Call the hotel or event facility directly for handicapped parking information.