

*For concrete and general contractors, engineers/architects, facility managers and other decision makers dealing with concrete repair*

## **Repair of Concrete**

**April 10-12, 2006  
Madison, Wisconsin**

**Learn how to**

- ▶ **Assess concrete damage and deterioration**
- ▶ **Select cost-effective repair materials and methods**
- ▶ **Perform effective repairs**
- ▶ **Ensure good concrete construction**

*Printed on recycled paper.*



**COLLEGE OF ENGINEERING  
UNIVERSITY OF WISCONSIN-MADISON**

Department of Engineering Professional Development  
432 North Lake Street Madison, Wisconsin 53706

Nonprofit  
Organization  
U.S. Postage  
PAID  
University of  
Wisconsin



THE UNIVERSITY  
*of*  
**WISCONSIN**  
MADISON

**COLLEGE OF ENGINEERING ■ DEPARTMENT OF ENGINEERING PROFESSIONAL DEVELOPMENT**

# **Repair of Concrete**

**A practical three-day course to help you solve your concrete repair problems. You will explore proven techniques to**

- **Achieve durable concrete**
- **Assess concrete damage and deterioration**
- **Select cost-effective repair materials and methods**
- **Ensure effective concrete repairs**

**For concrete and general contractors, engineers, architects, and other decision makers dealing with concrete repair**

**April 10-12, 2006  
Madison, Wisconsin**



# Repair of Concrete

April 10–12, 2006 in Madison, Wisconsin

## Are you involved in concrete repair projects?

Do you need to know more about

- ✓ how to achieve durable concrete?
- ✓ how to analyze the extent of concrete deterioration?
- ✓ what concrete repair methods will work best for solving your specific problems?
- ✓ how to determine which concrete repair techniques are cost-effective for your projects?
- ✓ how to perform effective concrete repairs?

This course will provide practical answers to these questions.

## Focus on Cost-Effective Repair Practices

This intensive three-day course will bring you up to date on cost-effective methods of concrete repair. You will examine

- what causes concrete to fail and how to ensure good concrete construction from the beginning
- how to assess the extent of concrete damage or deterioration on your project
- what repair materials and methods to use for specific concrete failures
- what methods to use for effective structural repairs
- how to employ polymer materials for concrete repairs
- how to select cost-effective concrete repair procedures

## Nationwide Audience

For many years the University of Wisconsin–Madison has been conducting highly successful courses on the repair of concrete. These practical courses have been receiving excellent ratings from course participants nationwide. The course sessions reflect the latest developments in concrete repair and the interests of former course participants.

Contractors, engineers/architects, facility managers and other decision makers who deal with concrete repairs will benefit by attending this practical course. **If you are involved in the repair of buildings, parking garages, highways, runways, bridges, dams or water retention structures, plan to attend.** No degree in engineering or any other prerequisite is required for participation in the course.

## Valuable Take-Home Materials

As an attendee you will receive a course notebook containing materials relating to the course sessions. These materials will serve as a useful reference to you and your organization.

## Expert Faculty

Your course instructors are nationally recognized and highly experienced practitioners and consultants in concrete technology and concrete repair and restoration. They will share with you their many years of experience gained from hundreds of projects and successful solutions to a multitude of concrete repair problems.

During the course question-and-answer periods, you will have opportunities to bring up your own concrete repair problems and issues. You will also be able to exchange ideas with the speakers and your fellow participants during the refreshment breaks and the luncheon periods. Take advantage of this opportunity to learn from leaders in the field of concrete repair and from other participants.

### For More Course Information

If you want more information on our other courses, see our Web site

<http://epd.engr.wisc.edu/catalogs/building.lasso>

## Course Outline

### Monday, April 10

#### 8:00 Registration

The Pyle Center  
702 Langdon Street  
Madison, Wisconsin

#### 8:30 Welcome and Introduction

Raymond C. Matulionis PhD, AIA  
Program Director  
Department of Engineering  
Professional Development  
University of Wisconsin–Madison

#### 8:45 Achieving Durable Concrete

- Fundamentals of quality concrete
  - cements
  - aggregates
  - admixtures
  - placing, consolidating, finishing
  - curing
- Understanding the causes of deterioration
- Common forms of deterioration
- Key factors in preventing concrete failures
- What is the proper repair approach for your project – an overview

George Seegebrecht PE  
Senior Evaluation Engineer  
Construction Technology  
Laboratories (CTL)  
Skokie, Illinois

Experienced in concrete research, and evaluation and repair of distressed concrete. More than 20 years of experience, with responsibilities including repair recommendations on numerous project types, such as buildings, parking facilities and bridges. Member of American Concrete Institute and its committee on pervious concrete.

# Repair of Concrete

April 10–12, 2006 in Madison, Wisconsin

## ...outline continued

9:30 *Coffee and Conversation*

10:00 *Achieving Durable Concrete (continues)*

11:30 *Lunch at The Pyle Center*

12:30 *Evaluating Concrete Condition*

- Types of damage
  - cracking, water leakage, staining
  - corrosion-related damage
  - structural deficiencies and distress
  - fire damage
- Strength considerations
- Durability considerations
- Assessing the risk of failure
- Methods of damage assessment
- Reporting-data reduction

*Predrag L. Popovic PE, SE*

Principal and Vice President

Wiss, Janney, Elstner Associates, Inc.  
Northbrook, Illinois

Responsible for more than 150 major concrete repair projects including parking structures, bridges and buildings. A participant in course series on concrete repair and restoration, sponsored by ACI and the World of Concrete. Author of many technical publications.

2:30 *Coffee and Conversation*

3:00 *Concrete Repair Materials and Their Properties, and Fundamentals of Concrete Repair*

- Types
- Dimensional stability
- Modulus of elasticity
- Coefficient of thermal expansion
- Permeability
- Conductivity

*James Warner PE*

Consulting Engineer

Mariposa, California

Specializes in concrete restoration and solutions to construction problems. Responsible for several hundred concrete restoration and repair projects. Honorary life member of International Concrete Repair Institute. Frequent speaker at courses on concrete, including at the World of Concrete.

4:00 *Concrete Removal and Surface Preparation*

- Conventional methods
- Hydrodemolition
- Hydraulic nibblers
- Diamond cutting
- Mechanical scarification
- Abrasive blasting

*James Warner PE*

5:00 *Adjourn for the Day*

## Tuesday, April 11

8:00 *Concrete Removal and Surface Preparation (continues)*

9:30 *Coffee and Conversation*

10:00 *Structural Repairs*

- Post-tensioning repairs
- External post-tensioning
- Shear collars
- Supplemental shear reinforcement
- Overlays
- Using appropriate repair methods for different structures
- Case studies

*Predrag L. Popovic PE, SE*

12:30 *Lunch at The Pyle Center*

1:30 *Concrete Repair Specifications*

- Writing a specification for quality repair
- Monitoring repairs for conformance to specifications

*Predrag L. Popovic PE, SE*

2:30 *Coffee and Conversation*

3:00 *Protection Methods for Concrete Structures*

- Paints
- Membranes
- Sealers
- Overlays
- Cathodic protection
- Case studies

*Predrag L. Popovic PE, SE*

5:00 *Adjourn for the Day*

## Wednesday, April 12

8:00 *Repair Methods for Concrete*

- Reinforcing steel considerations
  - corrosion: chlorides, carbonation
  - welding
  - new steel dowels
- Concrete
- Super-plasticized concrete
- Dry pack
- Shotcrete
- Preplaced aggregate concrete
- Latex-modified concrete
- Pressure grouting
- Epoxy crack injection

*James Warner PE*

10:00 *Coffee and Conversation*

10:30 *Repair Methods for Concrete (continues)*

12:00 *Lunch at The Pyle Center*

1:00 *Repair of Pavement, Sidewalks and Slabs on Grade*

- Crack repair
  - epoxy injection
  - route and seal
  - stitching/pinning
- Joint stabilization
  - subsealing
  - load transfer devices
- Displaced slabs
  - slabjacking
  - grinding
- Overlays and coatings
  - bonded
  - unbonded
  - latex modified concrete
  - thin polymer
  - self leveling
- Joint sealing

*James Warner PE*

3:30 *Final Adjournment*

## About Us

For more than 30 years, leading practitioners in engineering and construction have been attending the University of Wisconsin–Madison's Engineering Professional Development continuing education short courses. Our short courses are designed for professionals at all levels who seek the knowledge and skills necessary to increase their effectiveness or advance their careers.

Our in-house faculty members direct our short courses. Experienced professionals from private and public sectors serve as instructors. While the majority of our short courses are held in Madison, Wisconsin, we do structure customized courses for different organizations when requested.

## Four Easy Ways to Enroll

### Need to Know More?

Call toll free 800-462-0876 and ask for

#### Program Director:

Raymond C. Matulionis PhD, AIA  
matulionis@engr.wisc.edu

#### Program Assistant:

Sherry Daly

Or e-mail [custserv@epd.engr.wisc.edu](mailto:custserv@epd.engr.wisc.edu)

### General Information

**Fee Covers** Notebook, course materials, break refreshments, lunches, and certificate.

**Cancellation** If you cannot attend, please notify us by April 3, and we will refund your fee. Cancellations received after this date and no-shows are subject to a \$150 administrative fee. You may enroll a substitute at any time before the course starts.

**Location** The Pyle Center, 702 Langdon Street, Madison, Wisconsin. If you must be contacted during the course, phone messages may be left for you at 608-262-1122.

**Accommodations** A block of sleeping rooms for course participants is available at The Campus Inn, 601 Langdon Street in Madison (one block from our conference center). To receive the special rate of \$99/single or \$114/double plus tax, call 800-589-6285 by March 18, refer to group code #47457, and mention the course title. **Room requests made after March 18 will be subject to availability, although accommodations should be available at this or other nearby hotels until the course date.** Your enrollment confirmation will include other hotel/motel information. If you have any questions, please call us.

## Continuing Education Credit: This Course

This course qualifies toward professional licensing requirements in many states: check with your local state licensing board.

#### University of Wisconsin:

1.8 Continuing Education Units (CEU)

#### American Institute of Architects (AIA):

18 Learning Units (LU); qualifies for HSW credit

#### Engineering Professionals:

18 Professional Development Hours (PDH)

## Our Course Location

The Pyle Center, the course site, is in the heart of the UW-Madison campus. You will be just steps from a number of hotels, downtown Madison's State Street with its unique shops, restaurants, and entertainment, and the State Capitol, an impressive, recently restored structure.



**Phone:**  
800-462-0876 or  
608-262-1299 (TDD 265-2370)



**Internet:**  
<http://epd.engr.wisc.edu/webG674>

**Mail to:**

Engineering Registration, The Pyle Center  
702 Langdon Street, Dept. 106  
Madison, Wisconsin 53706



**Fax:**

800-442-4214 or 608-265-3448



#### Course Information

Please enroll me in **Repair of Concrete**

**Course #G674** April 10-12, 2006 in Madison, WI Fee: \$895

**Team Discount:** \$795 each when two or more enroll from the same organization

I cannot attend at this time. Please send me brochures on future courses.

#### Personal Information (Please print clearly.)

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ Fax (\_\_\_\_) \_\_\_\_\_

E-mail \_\_\_\_\_

#### Additional Enrollees

Name \_\_\_\_\_

Title \_\_\_\_\_

E-mail \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

E-mail \_\_\_\_\_

#### Billing Information

Bill my company  P.O. or check enclosed (Payable in U.S. funds to UW-Madison)



Cardholder's Name \_\_\_\_\_

Card No. \_\_\_\_\_ Expires \_\_\_\_\_

UW#

**Important—please enter  
the 3-digit UW# Code  
from the mailing label.**

Please check the box if you are a person with a disability and desire special accommodations. A customer service representative will contact you. Requests will be kept confidential.