

# REPAIR, PROTECTION & MAINTENANCE OF CONCRETE STRUCTURES IN THE GULF

## INTRODUCTION

Over the last decade, concrete rehabilitation has become recognized to be a "stand alone" discipline requiring very specialist knowledge and expertise. This course has been developed to cover the latest advances in materials and techniques and the current state-of-the-art for the repair protection of concrete structures. The presenter's experiences as a concrete materials consultant and a "troubleshooting" investigator will be used for many of the topics that will be covered. Various concrete deterioration mechanisms will be identified, together with the way in which failure to understand them can impact on the development of a concrete restoration strategy.

## GOALS & OBJECTIVES

To identify the many advances in technology that have occurred over recent years and how they can provide considerable benefit to the concrete repair and protection industry - and ensure that we get it right the second time!

To facilitate learning from the current state-of-the-art and the experiences of others.

To identify many types of mistakes that have often caused major disputes or conflicts and have usually resulted in costly remedial work

## PRESENTER

### Mr. Paul Jeffs

Mr. Paul Jeffs is President of PJ Materials Consultants Limited, based in Guelph, Ontario since 1989. He has over 35 years experience within the field of materials technology and has been involved on many major construction projects around the world, including the UAE, Saudi Arabia, Bahrain, Qatar and Kuwait. He has provided materials related expertise as a consultant for numerous industries and has authored many technical papers. In 1979 he moved to Japan and established a regional base from where he became involved in projects throughout South East Asia, including the Philippines, the Republic of Korea, Hong Kong, Taiwan, Indonesia, Singapore and Malaysia. Prior to emigrating to Canada in 1982, he was involved in construction projects in South Africa and India.

Paul is a lecturer with Dalhousie University's Continuing Technical Education Department and provides courses across Canada on such topics as durable concrete mix design and construction, concrete repair and protection, the restoration of heritage and masonry structures and the design and construction of concrete slabs on grade. He also regularly presents public and in-house courses in the Middle East. Paul has been a guest lecturer for several Canadian universities, the Canadian Society for Civil Engineering, the Canadian Dam Association, a speaker at many conferences and has authored or co-authored numerous technical articles

## PROGRAM

### DAY ONE

#### ● INTRODUCTION TO CONCRETE REPAIR

- Why understanding the difference between cause and effect is important - case studies
- What are the problems? - failure and deterioration types and mechanisms
- Why do concrete repairs often fail? - materials - methods - design - combination effect

### DAY TWO

#### ● THE INVESTIGATION AND STRATEGY DEVELOPMENT PROCESSES

- Understanding the investigation process - non-destructive testing - troubleshooting - case studies
- Designing a concrete repair and protection strategy - key design considerations and strategy components
- Planning a concrete restoration project - specification development - bid documents and process
- Restoration Strategies and their effect on electrochemical compatibility - rebar treatments - waterproofers - chloride extraction - realkalization - cathodic protection - metallizing - sealers - embedded anodes - corrosion inhibitors

### DAY THREE

#### ● STRENGTHENING, REMOVAL, PREPARATION, BONDING & CRACK REPAIR

- Modern strengthening techniques for concrete structures - exterior post-tensioning - fabricated

jackets and collars - composite wrapping-supplemental elements

- What are the best techniques for concrete removal and substrate preparation? - hand and mechanically operated equipment
- Substrate preparation and bonding agents - are they really necessary?
- Crack repair methods, materials and techniques - routing and sealing - injection - vacuum impregnation

### DAY FOUR

#### ● JOINT REPAIR, CONCRETE REPAIR MATERIALS & APPLICATION PROCEDURES

- Joint repair techniques and materials
- Concrete repair materials - cement-based - resin-based - properties - benefits and disadvantages
- Trowelling, spraying and forming repairs - what have we learned? - past problems - new techniques

### DAY FIVE

#### ● RESTORATION CASE STUDIES, CONCRETE PROTECTION, MAINTENANCE & MONITORING

- Restoration case studies - material selection - low pressure grouting - underwater repairs - slab replacement, etc
- Protecting your Investment - sealers - coatings - membranes
- Preventive maintenance & monitoring programmes