

### Introducing a More Convenient Way to Train

Ensuring safe performance is vital to personnel safety and plant profitability. A typical nuclear power plant has hundreds of motor-operated valves, air-operated valves, check valves, and electric motors that require reliable operation and maintenance in order to preserve a high level of safety. For years, CRANE Nuclear has offered a diverse curriculum of training courses specifically designed to help nuclear power utilities keep up with the latest technological advancements in their valves. Utilities have long recognized the inherent improvements in plant safety, efficiency, and quality that effective training can bring.

Now, to augment our existing training offerings, CRANE Nuclear is proud to introduce an additional scheduling option for students. No longer is a full class group required. Designed to accommodate busy nuclear professionals, CRANE Nuclear Open Enrollment Training empowers you to attend training at our facility, by yourself, or with a group. Multiple offerings of some of our more popular courses afford students the flexibility of date choices, and facilitate a course "track" of prerequisites and advanced coursework.

#### Benefits of CRANE Nuclear Open Enrollment Training

- No full class group required to book a course
- Multiple offering dates for popular courses
- Small class sizes for maximum student/instructor interaction
- Excellent training facilities
- Experienced, knowledgeable instructors
- Dedicated, representative training equipment



For detailed course descriptions, see page 3, or visit our website at: [www.cranenuclear.com/training/courses.php](http://www.cranenuclear.com/training/courses.php)

Classrooms are well organized, and equipped with extensive equipment and tooling for hands-on training, as well as multimedia presentation technology for electronic training aids.



Training at CRANE Nuclear is enhanced by the use of an extensive supply of representative valves, actuators, and online resources.



With cutaway equipment, trainees gain valuable knowledge of components and system construction, creating an interactive learning environment.



CRANE's Flow Loop allows trainees to apply their knowledge in "live" situations.

## Course Schedule (Winter)

| Part Number  | Course  | Dates Offered (Starting)   | Recommended Prerequisites | Duration | Tuition Per Student |
|--------------|---|----------------------------|---------------------------|----------|---------------------|
| TR-9-90540-H | Comprehensive Control Valve Maintenance                 | 24-Jan-2011<br>14-Feb-2011 | None                      | 5 Days   | \$2,875             |
| TR-9-70200-H | Valve Maintenance and Repair and Theory                 | 24-Jan-2011<br>07-Feb-2011 | None                      | 5 Days   | \$2,875             |
| TR-9-70110-H | Limatorque <sup>®</sup> Actuator Maintenance and Repair | 24-Jan-2011<br>14-Feb-2011 | None                      | 5 Days   | \$2,875             |
| TR-9-90530-H | AOV Actuator Instrumentation and Maintenance            | 21-Feb-2011                | None                      | 5 Days   | \$2,875             |
| TR-9-90510-H | AOV Data Acquisition and Basic Analysis                 | 10-Jan-2011<br>31-Jan-2011 | TR-9-90530-H              | 5 Days   | \$2,875             |
| TR-9-90400-H | MOV Data Acquisition and Basic Analysis                 | 10-Jan-2011<br>31-Jan-2011 | TR-9-70110-H              | 5 Days   | \$2,875             |
| TR-9-90520-H | AOV Advanced Signature Analysis                         | 17-Jan-2011<br>07-Feb-2011 | TR-9-90510-H              | 5 Days   | \$2,875             |
| TR-9-90410-H | MOV Advanced Signature Analysis                         | 17-Jan-2011<br>21-Feb-2011 | TR-9-90400-H              | 4 Days   | \$2,300             |

## Terms and Conditions

- All courses are offered in CRANE Nuclear Kennesaw, GA Training Center.
- Pricing is per US Domestic student, per course, and includes all classroom materials.
- Pricing does not include food, lodging or transportation.
- CRANE reserves the right to limit class sizes.
- Class registrations are not confirmed until full payment or an authorized P.O. is received by CRANE.
- CRANE reserves the right to cancel any class. If a class is cancelled, students will be notified via telephone and e-mail. Every effort will be made to reschedule a cancelled class or transfer enrollments to a later date.
- A refund will be given for any class registration cancelled at least 30 days prior to a class start date.
- If notification is received at least two weeks prior to the start of the course, credit may be granted to a later seminar date. No refunds are available for cancellations made less than 30 days prior to the start of the scheduled course.
- Group discounts are available, though all attendees must register at the same time to receive group discount.
- If a registered participant is unable to attend the course, a substitute attendee is welcome to take their place at no additional cost, provided the substitute is eligible to attend.
- Course attendee substitutions are acceptable any time prior to the course start date, but CRANE must be notified in writing (e-mail is acceptable) prior to the class start date.

To register for a course, please complete the registration application at:  
[http://www.cranenuclear.com/admin/uploads/training\\_registration\\_application.pdf](http://www.cranenuclear.com/admin/uploads/training_registration_application.pdf)  
 or contact your Regional Sales Manager:  
[tteske@cranevs.com](mailto:tteske@cranevs.com) - [tbrewer@cranevs.com](mailto:tbrewer@cranevs.com) - [rstirling@cranevs.com](mailto:rstirling@cranevs.com)

## Course Descriptions

### **TR-9-90510-H AOV Data Acquisition and Basic Analysis**

This course provides instruction on the proper installation and operation of the CRANE Nuclear Universal™ / VIPER™ 20 Air-Operated Valve (AOV) Diagnostic System through classroom instruction, hands-on laboratory training, and accounts of testing experience. Upon successful completion, the student shall be able to correctly set-up and operate the CRANE Nuclear Universal™ / VIPER™ 20 Diagnostic System to acquire test data and evaluate typical AOV performance parameters and common actuator/valve degradations through basic signature analysis techniques.

### **TR-9-90520-H AOV Advanced Signature Analysis**

This course provides instruction on the analysis of acquired Air-Operated Valve (AOV) performance test data utilizing the CRANE Nuclear Universal™ / VIPER™ 20 AOV Diagnostic System.

### **TR-9-90530-H AOV Actuator Instrumentation and Maintenance**

This course provides instruction on the proper installation, operation, and maintenance of Air-Operated-Valve (AOV) Instruments and Actuators through hands-on laboratory training, and operating experiences. Upon successful completion, the student shall be able to correctly perform maintenance on various AOV actuators and instruments commonly utilized in the Nuclear Power Industry.

### **TR-9-90540-H Comprehensive Control Valve Maintenance**

This course will introduce students to control valves and how to perform mechanical maintenance on both Linear and Rotary styles. This course can be structured to plant-specific valves and will instruct students in the proper maintenance and repair techniques for control valves. Students will learn various Linear and Rotary control valve comparisons and variables. Instruction will also include performing proper Stack Height measurement, Packing configuration, Consolidation and Torquing techniques. Learning how to "read" the parts will be a critical part of the instruction.

### **TR-9-70200-H Valve Maintenance and Repair**

This course provides instruction on how to maintain gate, globe and check valves for optimum working condition. Included are discussions on motor-operators, air-operators, hydraulic-operators, and manual-operators. The classroom discussion and hands-on laboratory experience covers the principals of operation, disassembly, inspection, adjustment, and reassembly of gate, globe and check valves. An overview is presented on the techniques of packing removal and installation, lapping of valve seats and wedges to facilitate fit up, blue check, and in-line machining of valve components, including the use of specialty tools.

### **TR-9-90400-H MOV Data Acquisition and Basic Analysis**

This course provides instruction on the proper installation and operation of the CRANE Nuclear Universal™ / VIPER™ 20 Motor-Operated Valve (MOV) diagnostic system through classroom instruction, hands-on laboratory training, and accounts of testing experience. Upon successful course completion, the student shall be able to correctly set-up and operate the CRANE Nuclear Universal™ / VIPER™ 20 MOV system, adjust actuator limit and torque switches to a specified criteria, and identify critical MOV parameters and common actuator/valve degradations through basic signature analysis techniques.

### **TR-9-90410-H MOV Advanced Signature Analysis**

This course provides instruction on signature analysis utilizing the CRANE Nuclear Universal™ / VIPER™ 20 Motor- Operated Valve (MOV) diagnostic system. The signature analysis techniques covered in this course will include: critical MOV parameters, actuator/valve degradations, and the components of differential pressure traces. An overview is presented on generic acceptance criteria for MOVs and industry-standard pressure equations.

### **TR-9-90340-H MC2 Data Acquisition and Analysis & FFT**

This course provides instruction on the utilization of the CRANE Nuclear MC2™ data acquisition system through classroom instruction, hands-on laboratory training, and accounts of testing experience. Upon successful course completion, the student shall be able to correctly set-up and operate this equipment to perform basic data acquisition and signature analysis. Instruction will include the following topics: software, proper installation, operation, and maintenance.

This course provides instruction on Motor-Operated Valve (MOV) Actuator Frequency Identification, Frequency Domain Characteristics, FFT Tracking & Trending, and Repeatability of Acquisition/Analysis Techniques. This course is designed to further instruct students who have previously received training on CRANE Nuclear MC2™ and/or MPM™ System(s) Data Acquisition and Analysis.

### **TR-9-90600-H Check Valve Data Acquisition and Basic Analysis**

The course will instruct students in the use of acoustics, eddy current, and ultrasonic devices used for check valve diagnostics. The student will be shown the proper installation techniques for the diagnostic transducers and operation of the Universal (UDS) / VIPER 20 Check Valve System. The instructor will demonstrate how to acquire and store the signatures to provide information concerning the operation of check valves. Operational issues covered during the class will include; frequency of disk flutter, disk position in flow, and backseat disk tapping. The student will become familiar with the UDS / VIPER 20 Check Valve System software features for evaluation purposes.

### **TR-9-90610-H Check Valve Advanced Signature Analysis**

The course will instruct students in the advanced techniques for acoustics (AE), eddy current (EC) and ultrasonic (UT) theory and application for check valve diagnosis. The student will be taught advanced acquisition techniques as well as advanced signature analysis. The instructor will lecture on advanced techniques as result of operational experience and practical application for acoustic, eddy current and ultrasonic technologies. Operational issues covered during the class will include: advanced UT theory and application, AE advanced theory and application and eddy current advanced theory and application. The student will become familiar with advanced signature analysis.

### **TR-9-70110-H Limitorque® Actuator Maintenance and Repair**

This course provides instruction on mechanical and electrical operation of Limitorque® SMB, SB, SBD, and HBC actuators. Through classroom instruction and hands-on experience, this course shall provide the student with practical knowledge on the operation, refurbishment, trouble-shooting, and preventative maintenance of Limitorque® actuators. Instruction covers theories of operation of SMB-000 through SMB-4 and HOB3C through H3BC actuators, and provides hands-on disassembly/reassemble of various SMB and HBC actuators. This course may be restructured to emphasize SM or SMA. Actuators to fit specific requirements.