

## *Technical Description*

CRANE Nuclear offers to provide the services as described in this Technical Description subject to the pricing, terms and conditions delineated in the Commercial Description.

### **Limitorque<sup>®</sup> Actuator Technical Maintenance and Repair Training**

<b>Standard Class Size:</b>	6 Students per Instructor
<b>Maximum Class Size</b>	8 Students per Instructor
<b>Course Duration:</b>	5 Days
<b>Prerequisite:</b>	None
<b>Supplied Materials:</b>	A training manual for each student
<b>Suggested Training Aides:</b>	Various Limitorque actuators and assorted parts.
<b>Suggested Attendees:</b>	Plant electricians, mechanics, electrical and mechanical foremen, QC personnel, engineering personnel, and operations personnel.

#### **Course Description:**

This course will provide students with instruction in both mechanical and electrical operations of Limitorque SMB, SB, SBD, and HBC actuators. Through classroom instruction and hands-on job experience, this course will provide the student with practical knowledge necessary for the operation, refurbishment, trouble shooting, and preventative maintenance of Limitorque actuators.

Students will receive theory of operation of SMB-000 through SMB-4 and HOBC through H3BC as well as hands-on disassembly/reassemble of various SMB and HBC actuators.

This course may be restructured to emphasize SM or SMA Actuators to fit the client's requirements.

#### **Course Terminal Objectives:**

Each student will be required to pass a written exam with a minimum score of 80% in order to successfully complete this course. Upon successful completion of this training course, the student will:

- Identify each type of Limitorque actuator and describe their design and application differences.
- Perform all required preventative maintenance on a Limitorque actuator.
- Perform disassembly, inspection, repair, adjustments, lubrication, and reassembly of Limitorque actuator models SMB-000/00 and SMB 0 through SMB-4.

- Describe Limitorque maintenance updates and how they affect the installation, operation, and maintenance of plant valve actuators.
- Perform troubleshooting of both mechanical and electrical problems on malfunctioning Limitorque actuators.

### **Enabling Objectives:**

After the completion of this course, the student will:

- Describe the distinguishing characteristics of SMB-000, SMB-00, SMB-0 – 4, SB, and SBD.
- Describe the lubrication requirements of Limitorque actuators, including the parts requiring lubrication, the authorized types of lubrications and the specified lubrication frequency for the different actuator parts and discuss the hazards and possible consequences of mixing different types of lubricants.
- Describe in detail the mechanical operation of the SMB- 000/00 and SMB-0 through SMB-4 actuators in the motor mode.
- Explain the operation of the actuator in the manual mode, including the purpose and function of the following: Tripper finger assembly, Clutch ring and clutch keys, Declutch shaft and handle, Handwheel and handwheel gear, Trippers, Worm shaft clutch, Worm shaft clutch gear, Handwheel clutch gear, Declutch link, and Declutching shaft torsion spring.
- Identify typical failures of Limitorque actuators and explain trouble shooting techniques for mechanical problems.
- Label all parts of a typical Worm/Spring Pack Assembly and describe its operation and function in the actuator.
- Explain the basic electrical control circuit of a Limitorque actuator.
- Explain the operation and function of a typical Torque Switch and Limit Switch and how they interface with the rest of the actuator.
- Explain and demonstrate the procedure for adjusting Limit Switch settings and Torque Switch Calibration/Adjustment.
- Describe and identify the parts and material requirements for a Limitorque actuator to be classified as environmentally qualified.
- Demonstrate the ability to disassemble, inspect, repair, reassemble, and make necessary adjustments on Limitorque actuator models SMB-000/00 and SMB-0 through SMB-4.
- Describe the refurbishment inspection procedure for mechanical and electrical components of all Limitorque actuator Models.

### **Course Benefits:**

- Increased knowledge of Limitorque actuator operation and terminology, which in turn shall improve workmanship, efficiency, and enhance troubleshooting efforts.

- Improved Limatorque actuator maintenance which results in less maintenance related actuator failures, improved actuator reliability, and increased actuator life.
- Decrease the number of Limatorque actuator disassembly/ reassembly errors.
- Elimination of common Limatorque actuator maintenance misconceptions (i.e.. filling the motor with grease or filling the actuator gear box with grease intended for the limit switch gear box).