



**HANNA**  
NUCLEAR



**NUCLEAR POWER  
GENERATION**

*Safety-Related  
and Commercial  
Actuation Products*

Est. 1901



# DESIGNING AND BUILDING ACTUATION FOR DEMANDING 21<sup>ST</sup> CENTURY APPLICATIONS

**Today, many industrial applications like nuclear power generation demand more from hydraulic and pneumatic actuators than ever before.**

Greater pressures. Higher speeds. Closer tolerances. Zero leakage performance. Servo/proportional system response.

Meeting these high performance demands requires true premium-quality actuators — such as the nuclear product lines offered by Hanna Nuclear.



**For over a century Hanna, a small business, has earned a reputation as an industry innovator.** We continually strive to stay on the leading edge of motion control technology by utilizing the latest in state-of-the-art designs and materials in our products.

What's more, only Hanna offers a single source for safety-related and commercial tie-rod, mill-type, rotary and custom-welded actuators, ASME-U Stamped certified pressure vessels, and valve manifolds.

With over 100 years of experience engineering and manufacturing custom actuators, we can make any actuator from 1.50" to 40.00" bore with stroke lengths up to 400" and pressures to 10,000 psi.



Our 108,000 ft<sup>2</sup> state-of-the-art facility has 3D CAD and ERP systems, large machining centers, boring mills, honing equipment, in-house painting, and special packaging. All of these capabilities along with our quality assurance program, which meets 10 CFR 50 Appendix B requirements, ensures that all of our products meet industry standards and your specifications.

From harsh environment applications to complex actuators, **we can design and build an actuator to meet all of your requirements.**





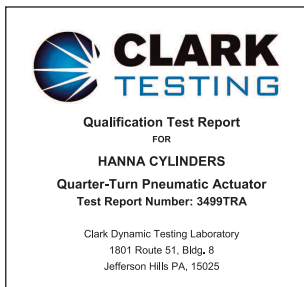
# PROVEN. RELIABLE. CERTIFIED. QUALIFIED. NUCLEAR ACTUATION.

Inside and outside of containment. From main steam isolation valves (MSIVs) and feedwater valves to reverse engineering of long-obsolete actuator designs to new projects that require nuclear-qualified rising stem or quarter-turn actuators, **we can — AND WILL — do it all.**

Our ability to design and manufacture linear and rotary actuators to meet your needs comes from our over 45 years of nuclear-industry experience, an extensive global installed base and know-how we acquired from Chicago Fluid Power in 1990.

When it comes to quality, delivery and technical support, **WE'RE 2<sup>ND</sup> TO NO ONE!**

## Certification/Qualification



All of our nuclear actuators are certified to the following standards. When requested we will conduct environmental testing to make them nuclear qualified, as well. However, we've proactively designed and had our quarter-turn actuators tested for nuclear qualification so environmental testing isn't required.

- US NRC 10 CFR 50 Appendix B
- US NRC 10 CFR Part 21
- ASME NQA-1
- ANSI N45.2
- IEEE Qualification
- NIAC-compliant Quality Assurance

CHICAGO  
FLUID POWER



## Installed Base Sampling

### Asia-Pacific

Bataan - Philippines  
South Korea  
Kuosheng - Taiwan

### Europe

Krsko - Slovenia

### United States

9 Mile Point 2 & 3  
Browns Ferry - TVA 1, 2 & 3  
Byron 1 & 2  
Dresden 1 & 2  
Edwin I. Hatch 1  
Indian Point  
Joseph M. Farley  
La Salle 1 & 2  
Quad Cities  
Sequoyah - TVA 1 & 2  
South Texas Project 1 & 2  
Susquehanna  
Virgil C. Summer  
Watts Barr - TVA 1 & 2

# SAFETY-RELATED & COMMERCIAL PRODUCTS

Hanna offers the nuclear power generation market a wide array of products, services and capabilities.

## Services and Capabilities

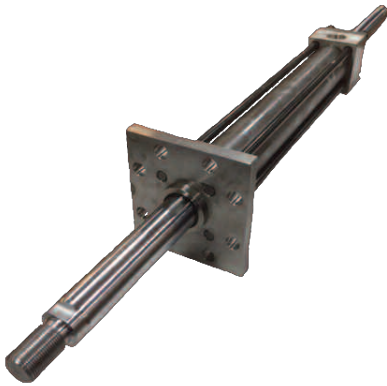
- Like-for-like Reverse Engineering
- OEM Inventory Management
- Actuator Repair/Refurbishment
- Individual Parts Machining
- Special Packaging
- Design and Manufacture Manifold Panels
- Precision Machining
- Custom Materials
- Plumbed/Fixtured per Customer Specifications

## ACCESSORIES

### Piston Accumulators

Highly-customizable

<b>Materials:</b>	Per design specifications
<b>Volumetric Sizes:</b>	Per design specifications
<b>Port Sizes:</b>	Per design specifications
<b>Pressure Rating:</b>	up to 10,000 psi
<b>Options:</b>	Pressure Relief Valves Charging Valves Blow-off Discs, Customer Specific Coatings & Mounting



### Snubbers

Heavy-Duty Tie Rod Construction

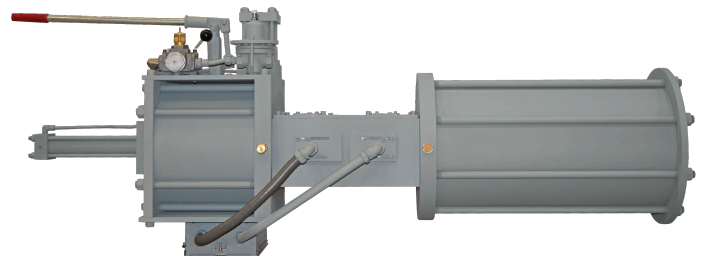
<b>Bore Sizes:</b>	1.50" – 14.00"
<b>Stroke Lengths:</b>	Per design specifications
<b>Pressure Rating:</b>	up to 3000 psi
<b>Features include:</b>	Pivot Mounted Both Ends Compensated Flow Control Valves Hi-load Piston & Gland w/ Synthetic Bearing

## ROTARY ACTUATORS

### Certified Quarter-turn Scotch Yoke

Safety-related, qualified to IEEE 323, 344, 382

<b>Bore Sizes:</b>	7.00" – 24.00" - Nuclear-qualified 6.00" – 32.00" - Commercial quality
<b>Torque:</b>	up to 500,000 in-lbf
<b>Pressure Rating:</b>	up to 250 psi
<b>Operation:</b>	Double Acting Spring Fail Open Spring Fail Close
<b>Options:</b>	End of Stroke Sensing Manual Override Plumbed/fixtured per Customer Specifications



Ø14" spring fail-close, rotary actuator has 100° of rotation and produces 19,000 in-lb of torque, minimum.

# LINEAR ACTUATORS



Ø10" x 8.25" stroke nitrogen gas-charged hydraulic actuator is spring fail-close with a 10.75" stop tube. It's pre-charged at 800 psi. The air/hydraulic pump retracts rod at 1,700 psi. Piped and valved for automatic operation at 60 psi. Seating thrust of 60,000 lbs.

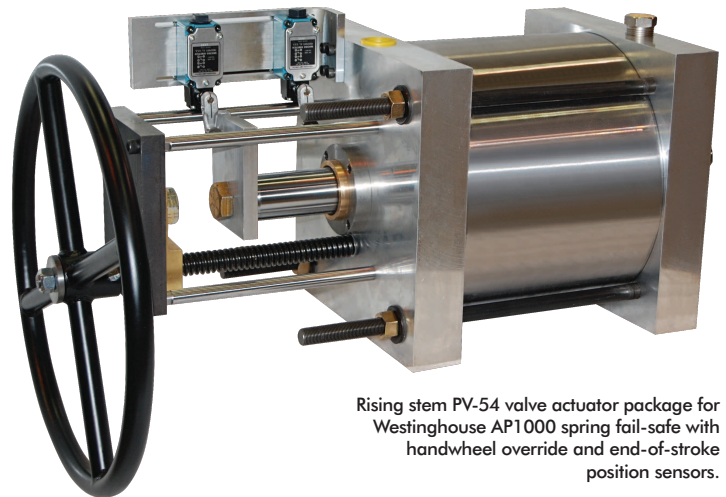
## Nitrogen Gas-charged Hydraulic Actuators

### Heavy-duty Construction

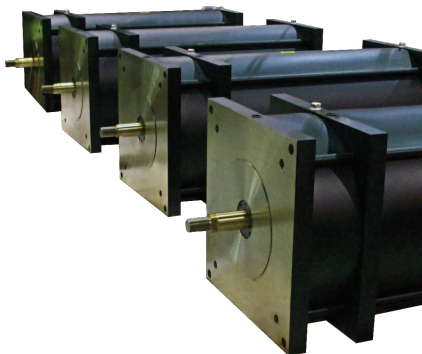
<b>Bore Sizes:</b>	4.00" – 14.00"
<b>Stroke Lengths:</b>	Per design specifications
<b>Pressure Rating:</b>	up to 3,000 psi
<b>Thrust:</b>	up to 300,000 lbs
<b>Operation:</b>	Spring Fail Open Spring Fail Close
<b>Options:</b>	Air/Hydraulic Pump Charge Electric Pump Charge Plumbed/fixed per Customer Specifications

## Rising Stem Actuators

<b>Bore Sizes:</b>	4.00" – 30.00"
<b>Stroke Lengths:</b>	Per design specifications
<b>Pressure Rating:</b>	up to 150 psi
<b>Thrust:</b>	up to 56,000 lbs - Double-acting up to 20,000 lbs - Fail-safe
<b>Operation:</b>	Double Acting Spring Fail Open Spring Fail Close
<b>Options:</b>	End-of-stroke Sensing Manual Override Plumbed/fixed per Customer Specifications



Rising stem PV-54 valve actuator package for Westinghouse AP1000 spring fail-safe with handwheel override and end-of-stroke position sensors.



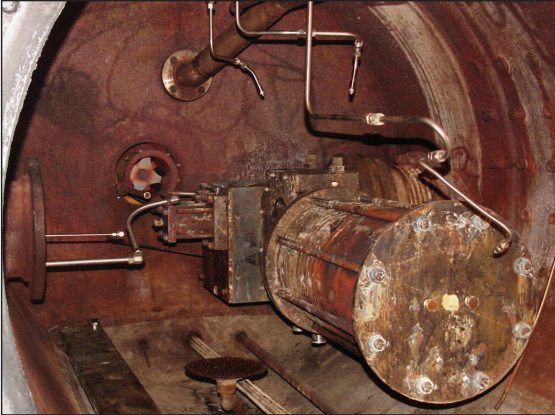
Ø26" x 4.12" stroke spring-extended tandem high-pressure air actuators with dual nested springs for fail-safe operation with total pre-load of 65,000 lbs. and final load of 76,000 lbs.

## High-pressure Air Actuators

<b>Bore Sizes:</b>	4.00" – 20.00"
<b>Stroke Lengths:</b>	Per design specifications
<b>Pressure Rating:</b>	up to 300 psi - Intensified air
<b>Thrust:</b>	up to 60,000 lbs
<b>Operation:</b>	Spring Fail Open Spring Fail Close
<b>Options:</b>	Head or Tie-rod Mounted End-of-stroke Sensing Hydraulic Manual Override Plumbed/fixed per Customer Specifications



# OUR STORY IN PICTURES



In January 2015, our quarter-turn rotary actuator successfully completed loss of coolant accident (LOCA) testing.

The actuator was subjected to intense heat and chemical spray in accordance with IEEE 382-2006, IEEE 344-2004 and IEEE 323-1974. During testing, the actuator was able to produce a minimum torque of 19,000 in-lb<sub>f</sub> (1,583 ft-lb<sub>f</sub>) at 80 psig inlet pressure with a minimum 90° rotation in under 10 seconds.



Our production staff is assembling (left) a Ø26" x 4.12" stroke, nested dual-spring, high-pressure air actuator for use on a 2<sup>nd</sup> stage moisture separator, reheated steam line (right). Our client requested a 700-pound weight reduction with a 16-week lead time. We achieved this specification by replacing the steel piston with an aluminum piston — and we delivered it in 12 weeks.

**Call or email us — or contact your local Hanna distributor — to request our case studies and learn more about our nuclear actuator manufacturing capabilities.**

# WHAT SETS US APART

## Speed of Delivery

Why wait nearly a year to receive your actuator?

Hanna provides customers with industry-leading speed of delivery while designing and manufacturing actuators tailored to your exact specifications. We're able to do this by having nearly every aspect of production in one location — and having a 10 CFR 50 quality assurance program optimized for speed and efficiency.

## In-house Manufacturing

Our 108,000 ft<sup>2</sup> facility enables us to have multiple machining centers, assembly, paint and special coating booths, and testing all under one roof, which reduces lead time.

## Product Repairs

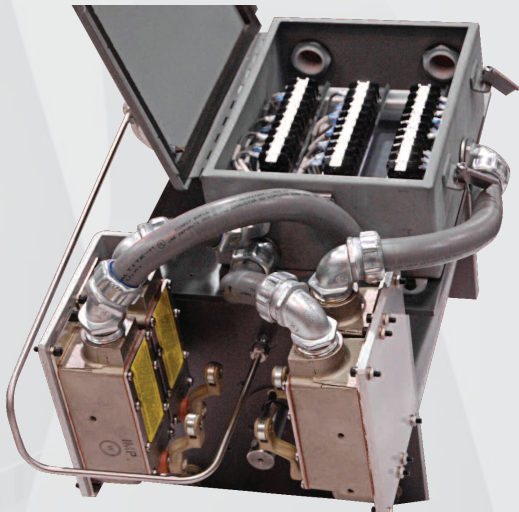
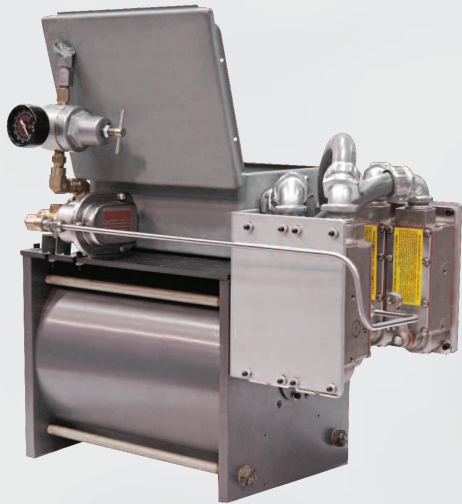
Maintaining actuators is essential to the operation and safety of a nuclear power plant. However, many of them are obsolete. Using reverse engineering and our 10 CFR 50 quality assurance program, we're able to make any component for our actuators — or any other manufacturer's actuators — allowing them to be repaired in containment, or refurbished at our factory for non-containment applications, without compromising any previous certifications.

## Extensive Installed Base

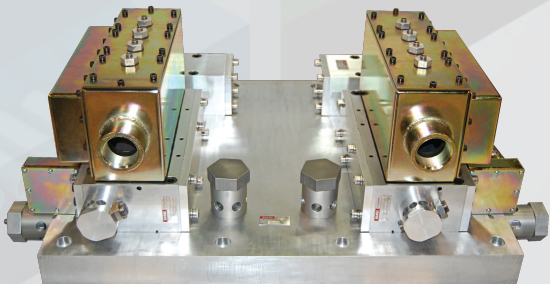
A large number of Hanna linear and rotary actuators are installed inside and outside of containment at nuclear power generation plants across Asia-Pacific, Europe and the United States giving us the technical know-how to satisfy your application.

## Product Range

Whether it is type of actuator, bore size, stroke length or available options, Hanna provides nuclear power plants with the widest range of actuation products and services — period.



This control panel/cylinder combination was a like-for-like rising stem valve re-engineering project in accordance with 10 CFR Part 21 and 10 CFR 50 Appendix B. We completed the project in 12 weeks from design to delivery.



We manufactured this directional control valve manifold to be attached to a Ø28" high-pressure air actuator that controls a MSIV at a Tennessee Valley Authority (TVA) facility.



# OUR CUSTOMERS COME FIRST!

Since 1901, Hanna has been striving to have the highest quality product on the market that can be delivered as quickly as possible with the right personnel on staff to assist our customers in any means necessary for technical support and assistance on any past and current jobs, or future inquiries. It's our belief, if we can provide those three things — **quality, delivery and technical support** — everything else will fall into place.

We've instituted a quality management system that seeks continuous improvement in our machinery, equipment, software, procedures and employee skills to provide products that satisfy — **and exceed** — customer and regulatory requirements.

Our Live Design platform allows customers to draw, model and obtain a quote on basic actuators in about 10 minutes. For your more complex applications our sales and design team are available via phone, fax, email or web-based conferencing — and we turnaround quotes within 24 hours and approval drawings and models within 1 – 3 business days.

When it comes to quality, delivery and technical support, **Hanna strives to be 2nd to no one!**

## Major Industries Served



CON-AG



INDUSTRIAL



MILITARY



NUCLEAR



OIL + GAS



# HANNA NUCLEAR

#### Headquarters:

8901 102<sup>nd</sup> St | Pleasant Prairie, WI 53158

#### Sales Office

Six PPG Place, Ste 850 | Pittsburgh, PA 15222

T: +1 262 764 8300 | F: +1 262 764 8290

[sales@hannacylinders.com](mailto:sales@hannacylinders.com) | [www.hannacylinders.com](http://www.hannacylinders.com)

#### Proud members of:



# Hanna

