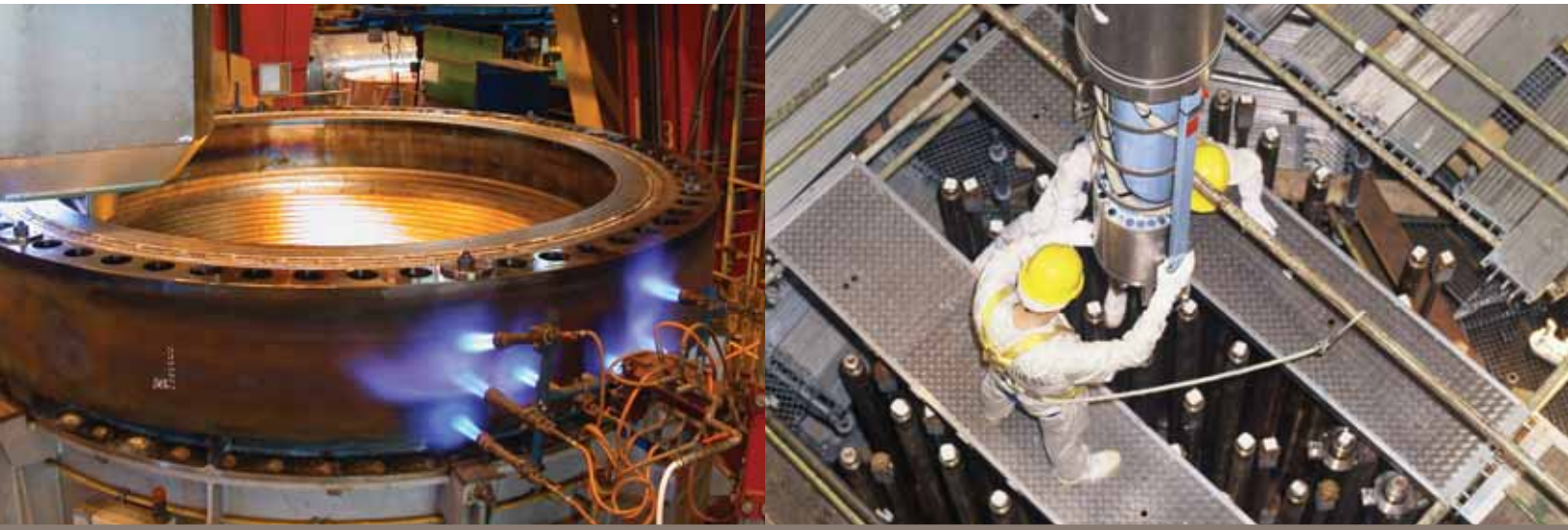




## Comprehensive Reactor Vessel Head Services

## Your Qualified Full-Service Vendor From Design to Asset Management



### A Wide Range of Services

Utility leaders count on AREVA for a wide range of component services, from design and fabrication through managing the asset. AREVA has the capabilities to manufacture **Control Rod Drive Mechanisms (CRDMs)** as well as **Reactor Vessel Closure Heads (RVCHs)**. Your advantage? Lower risk. In addition, as your full-service vendor, AREVA provides design, fabrication, project management, installation, heavy rigging, and disposal services. Because AREVA realizes that manufacturing is only a fraction of your entire RV Head Replacement Project.

### Vertically Integrated Global Resources

Listening to your expectations for safety, quality, performance and delivery results in consistent learning and innovation to help you achieve your RVCH goals, your way. That's why AREVA has a powerful cadre of global resources to tailor solutions for every specific need. Plus, AREVA is the only vertically integrated supplier whose main focus is on nuclear plants. As with all component replacement and repair projects, you can also rely on fully accountable points of contact throughout your project.

» **AREVA Has Successfully  
Delivered and Installed 18  
Reactor Vessel Heads in the U.S.**

## On-Time RVCH Delivery. Every Time. More than Any Other Vendor in the World.

With the industry's most responsive U.S. teams, AREVA's proven track record includes the successful fabrication of **156 original and replacement Reactor Vessel Closure Heads** for nuclear customers in **11 different countries** (including AREVA, CE, Westinghouse, and B&W-designed two-, three- and four-loop plants). All of these projects were delivered on schedule.





## Unparalleled CRDM Experience

AREVA's 35 years of experience in developing, refining and qualifying the CRDM installation process has created the world's most reliable CRDM replacement program. Moreover, AREVA has manufactured and installed CRDMs in vessel closure heads for over 80 nuclear units. To date, AREVA's installations number over **6,000 new CRDMs and hundreds of refurbished CRDMs**, including all seven B&W plants.

## CRDM Benefits

### Integrated Latch Housing Design

- Eliminates lower canopy seal — no potential for leakage
- No change in In-Service Inspection needs

### Single Piece Rod Travel Housing

- Eliminates joint at the top omega seal — no potential for leakage

### Omega Seal Weld

- No leaks in over 5,300 installations
- Ease of CRDM maintenance in the field
- No structural weld ISI inspection required

**Design Life of up to 8 Million Steps — trouble-free operation for our customers, and no corrosion issues — EVER.**



## CRDMs Manufactured to Only the Highest Standards of Performance

AREVA manufactures CRDMs that demonstrate proven reliability and long service life. In Europe, AREVA CRDMs routinely operate under rigorous conditions in the load-follow mode without failure. **Each CRDM comprises more than 100 parts** — all containing only the finest materials carefully selected and designed by AREVA.

These materials meet stringent requirements for their weldability, wear resistance, and heat/mechanical fatigue strength.

- Mechanical, electrical and dimensional checks
- Functional tests (cold and rated operating conditions)

Once installed, the CRDM can be controlled by monitoring its electrical characteristics and by measuring the latch closing times.

**» AREVA's Installations Number Over 6,000 New CRDMs and Hundreds of Refurbished CRDMs.**

## Service Structure Upgrades & Integrated Head Assemblies



IHAs, fabricated and installed by AREVA, are customized designs for Westinghouse, Combustion Engineering (CE), or B&W designs. Plants have realized outage reductions of up to **six critical path days**, as well as dose **reductions of three-to-four person REM** per outage. In addition, the highly safe design reduces the potential for personnel injury, while promoting **ZERO OSHA recordables**. The AREVA IHA includes features that eliminate most of the polar crane picks, leading to far fewer critical path operations. Shielded access doors around the lower shroud allow for open inspection access to both RVCH and CRDM penetrations. This enables you to compress outage schedules and get your plant reconnected to the grid in a shorter period of time. AREVA supplies IHAs and

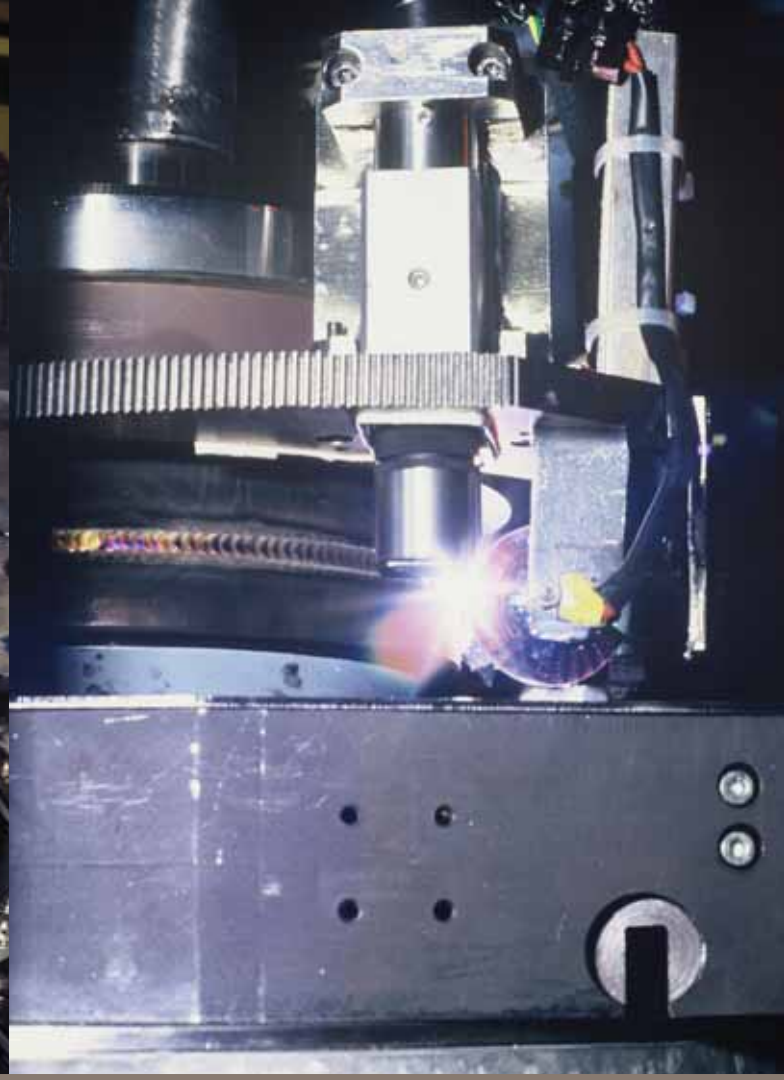
service structure mods to major U.S. and international customers, installing them with new RVCHs, CRDMs, cables and insulation – all on or ahead of schedule.

### Proven Design Advantages of the IHA

- Folding Batwings
- Improvements to Head Vent Routing and Connections
- Integrated Shielded Work Platform
- Improvements to CCW Line Connections
- Integrated or Rolling Missile Shield
- Integrated Shielding
- Integral Fans and Ductwork
- Dome and L-Panel Metal Reflective Insulation

**» AREVA IHAs Reduce Critical Path and Personnel Exposure**





## Setting the Example **World Record Head Replacement**

AREVA worked with the customer as a partner to achieve world record head replacement time **(25 days and six hours)** at Salem. This record still stands as the industry benchmark for executing a refueling outage while replacing a reactor vessel head.

“ On Sunday, November 6, 2005, the Salem 1 breaker was closed at 01:03 hours, concluding the world’s best reactor vessel head replacement. Total duration was 25 days, 6 hours — second to none. AREVA’s leadership through both 2005 reactor head replacements contributed to the two best and shortest Salem refueling outages ever. ”

— **Dick Labott**, Project Manager  
Salem 1 & 2 RVCH Replacements

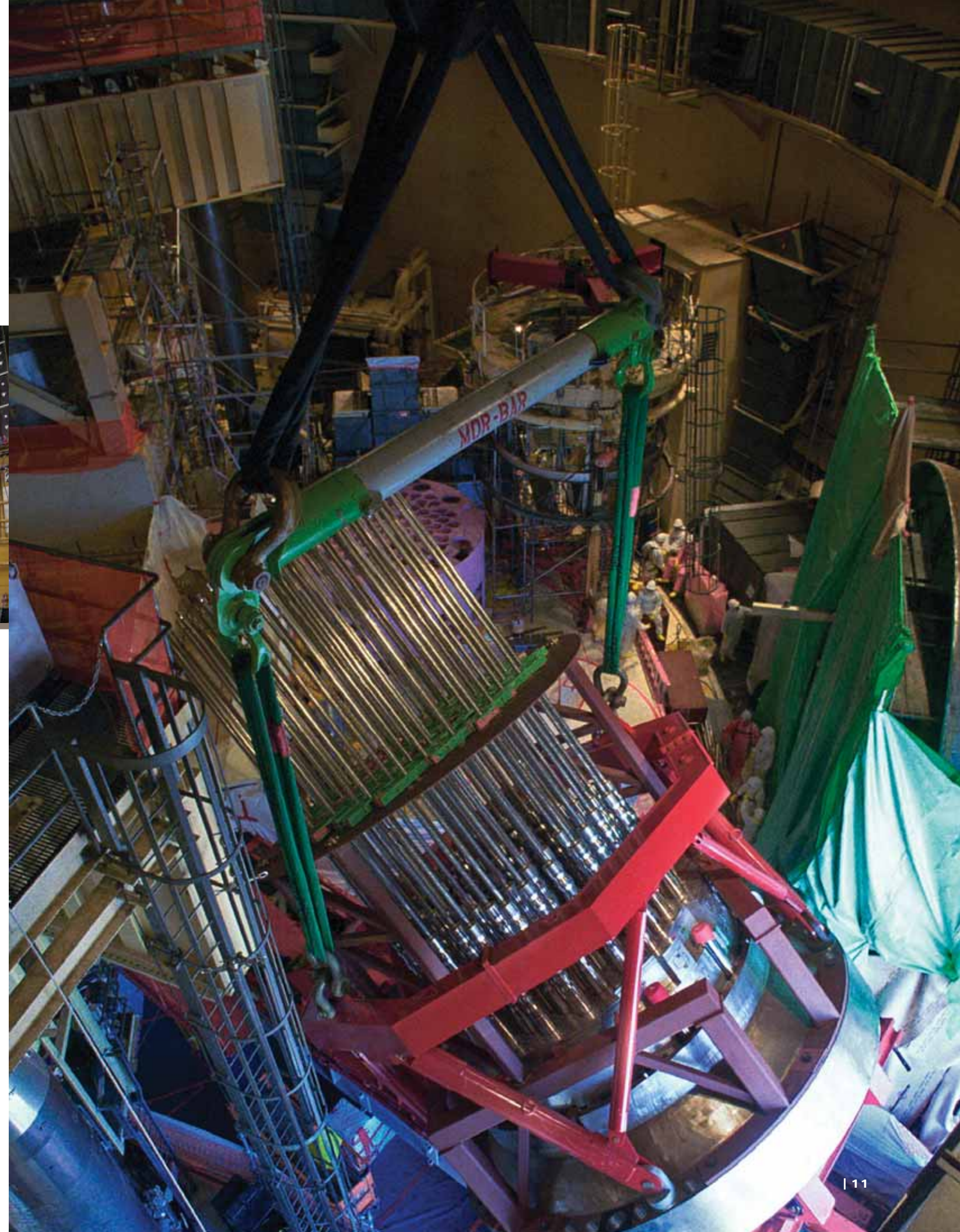
## Proven Experience Enhances Start-up Reliability

AREVA's experienced teams have proven time and again that lessons learned and applied enhance start-up reliability. Listening, learning and innovating is a way of life here. That's why AREVA remains the industry leader in RVCH manufacturing and installation.



## The Best Value = **Lowest Risk**

- Extensive experience: 156 original and replacement RVCHs manufactured, including 18 replacement heads for U.S. plants
- Capabilities to manufacture both replacement RVCHs and CRDMs
- The only vertically integrated supplier whose main focus is on nuclear plants
- A complete portfolio of replacement head services — from RVCH and CRDM fabrication to installation and service structure upgrades to disposal — ensuring proper fit, function, and value
- A leader in product innovation:
  - Exclusive integrated latch housing assembly to eliminate the risk of leakage from stress corrosion cracking
  - Integral rod-travel housing/cap to eliminate leakage paths from seal welds
  - Raw material improvements to ensure excellent mechanical properties and reliability of pressure-retaining components
- Performed World Record RVCH Replacement outage at Salem and this record still stands today. This experience and lessons learned will be applied to execution at your plant.
- The robustness of the AREVA design will reduce risk of an unplanned shutdown and increase operational performance.



AREVA provides its customers with solutions for low-carbon power generation in North America and all over the world.

As the leader in nuclear energy and a significant, growing player in the renewable energies sector, AREVA combines U.S. and Canadian leadership, access to worldwide expertise and a proven track record of performance. Sustainable development is a core component of AREVA's strategy.

Nearly 5,000 U.S. and Canadian employees work every day to make AREVA a responsible industrial player helping to supply ever cleaner, safer and more economical energy to the greatest number of people.

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