



GE VERNOVA

FACT SHEET

HITACHI

ULTRA™ CONTROL ROD BLADES

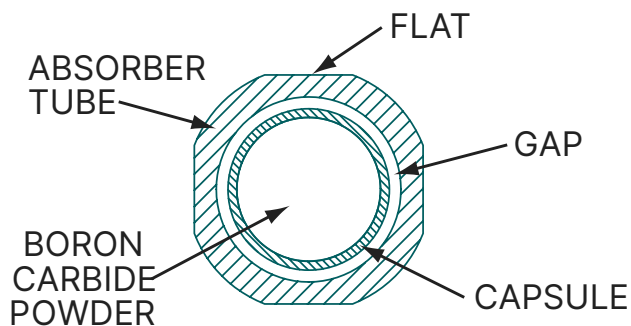
BUILT OFF THE EXPERIENCE OF THE
MARATHON CRB

DESIGNED FOR **INCREASED RELIABILITY**
OPTIMIZED THROUGH **IMPROVED**
MANUFACTURING AND QUALITY CONTROL

Based on the GE Vernova Hitachi Nuclear Energy (GVH) Marathon control rod design, the Ultra marks the next generation in the evolution of reliable and economical boiling water reactor control rods.

Reliability

The Ultra™ design is based on the simplified absorber tube, shown below, which offers superior capability to withstand helium pressurization loads and enhances reliability. A larger diametral gap between the capsule and the absorber tube is designed to eliminate all boron carbide swelling-induced strain on the outer absorber tube. This significantly reduces the likelihood of stress corrosion cracking.



Simplified Absorber Tube and Boron Carbide Capsule

Reliability Features

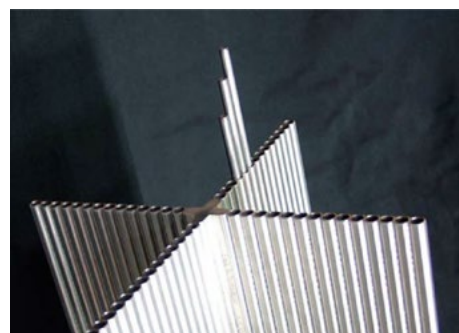
- Utilizes high purity, stabilized stainless steel tubing to help protect against stress corrosion cracking
- A laser welding process joins the simplified absorber tubes, reducing the residual stress and strain from control rod manufacturing
- Tube welds are inspected 100% by Eddy-Current
- Completely crevice-free in the irradiated portions of the assemblies, eliminating a significant source of potential stress corrosion cracking

Flexibility

The highly flexible Ultra™ control rod structure is capable of multiple absorber loadings, each with unique control rod lifetimes. Currently, both the medium duty Ultra™ MD and the high duty Ultra™ HD are offered.

Ultra™ MD Features

- It is an all boron carbide capsule loaded design
- Ideal for “shutdown” control rod locations, the Ultra is designed to combine high reliability with an economical absorber loading
- Great for original equipment control rod replacement, replacing the high cobalt pins and rollers with low cobalt materials, lowering the overall plant cobalt dose
- Designed to provide control rod lifetimes comparable to alternate long-life control rod options



Ultra™ HD Features

- The absorber loading combines boron carbide capsules with hafnium in high duty locations
- Ideal for control cell applications, the Ultra™ is designed for both reliability and a long lifetime

Interchangeability Features

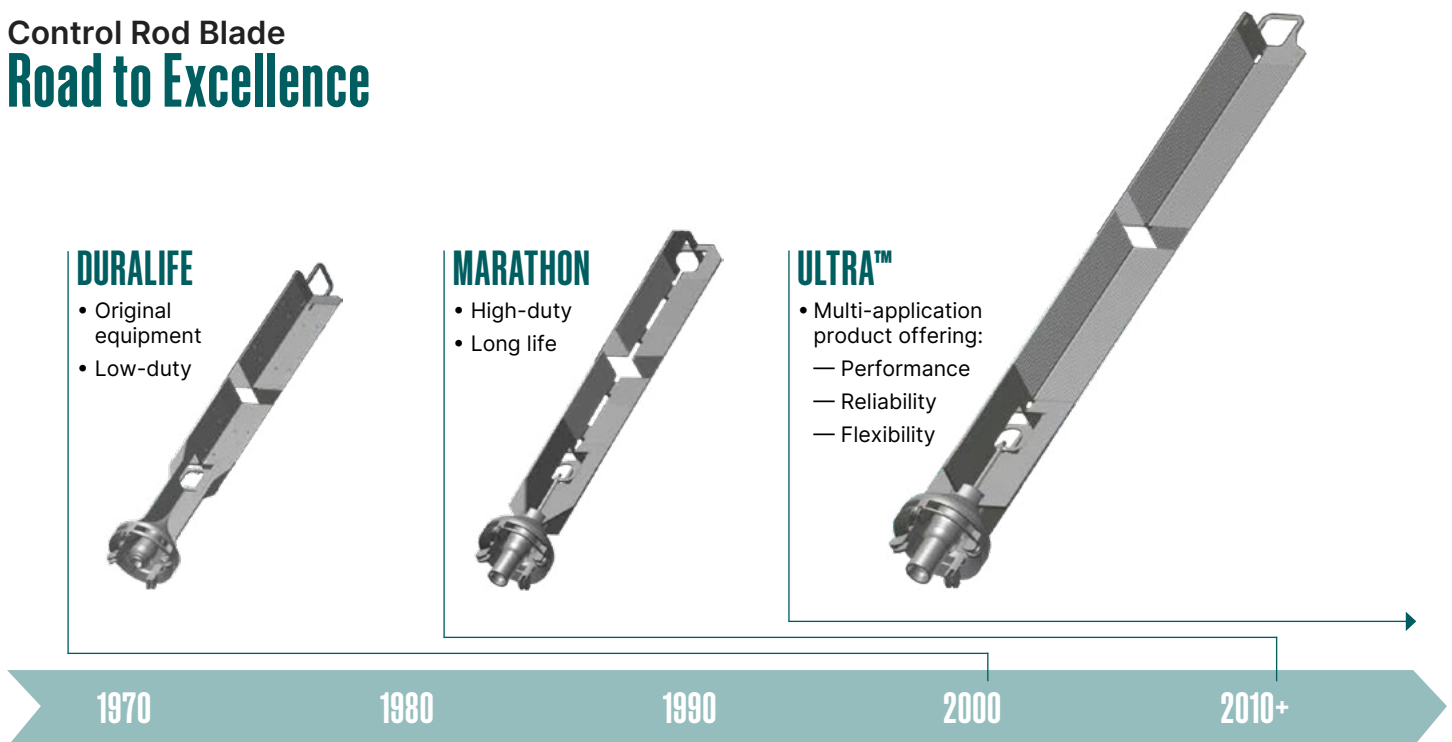
Ultra™ control rods are completely interchangeable with original equipment and other replacement control rods. The interface dimensions and outer dimensional envelope are identical to previous designs, and the total weight of Ultra™ control rods falls within the range of weights of previous control rods.

Economical

Ultra™ control rods are designed to offer a superior total life cycle cost when compared to other control rod options. The nuclear and mechanical lifetimes are designed to exceed that of alternative shutdown and long life control rods such that the number of exchanges needed during refueling outages is also reduced, thus reducing the number of control rods that need to be disposed.

The Ultra™ control rod is designed to minimize the end-of-life disposal cost, as well as reduced exposure levels during movements. These factors are accomplished by limiting the content of long-lived radionuclides, particularly nickel, cobalt, and niobium. The total stainless steel mass of the irradiated portions of the Ultra™ control rod is 20% less than original equipment control rods.

Control Rod Blade Road to Excellence



Learn more at governova.com/nuclear

