

Engineers survey nuclear power plant operations using a modern digital control system interface. Power plants today use information systems and digital monitoring to increase productivity, ensure reliability, and enhance safety.

Source: Idaho National Laboratory



INHERENT SAFETY TODAY

Transforming the safety paradigm

Forget what you thought you knew about nuclear safety. Just like most everything else, nuclear power plants are being transformed by innovation—from digital technology, to robotics and artificial intelligence. Today’s plants don’t just protect against risks, in some cases, the risks are being eliminated altogether.

From how we run our cities, deliver healthcare, get information, and produce our food, transformative change has swiftly occurred, even if the changes are not always immediately visible.

Take the automobile, for example. From the outside, it appears similar to those of 40 or 50 years ago, minus the hood ornaments, wood paneling, and pop-up headlights. But today’s car would feel more like a space station to a driver from the 1970s or even the 2000s. Modern automobiles are equipped with extensive safety systems—back up cameras, lane departure, blind spot sensors and other sophisticated technology that can rescue stranded motorists or help navigate you to the closest restaurant at the command of your voice.

Just as automobile manufacturers have used evolving technology to bolster safety and efficiency, so has the nuclear industry. The nuclear engineers of yesterday

would find the changes at their nuclear facilities mind-blowing right from the moment they walked in. They would enter through sophisticated security systems with biometric hand geometry scanners into a plant where increasingly, jobs once done manually are completed with robotic equipment and digital sensors.

“The nuclear industry embraces research and innovation as a valuable investment,” says Dr. Fiona Rayment, Executive Director, Nuclear Innovation and Research Office (UK).

Collaborative research and development is ongoing at national labs, universities, vendors and utilities.

Advanced information technology systems have played a significant role in transforming plant operations. Some plants now use digital monitoring to identify maintenance needs long before a problem ever occurs. Wireless sensors and pattern recognition software identify when

calibration is required, allowing maintainers to work on equipment as needed rather than an arbitrary time period increasing productivity and reliability, two precursors to safety.

The use of robots to perform tasks in radiological areas has been another transformation in improving worker and plant safety. Operators who once suited up for work in highly-challenging and uncomfortable conditions are now operating robots from a command centre. The robots’ built-in cameras and digital diagnostic systems give the operators far greater precision than the human eye, all at a safe distance from radiation.

Virtual reality platforms are allowing workers to practice and perfect tasks they’ll perform before ever entering the plant. Tools and equipment can be tested in exact conditions and modified for greater performance in this same simulated environment.

“Innovation will drive the pace of change required through solutions that enhance economic performance, while continuing to underpin a strong and sustainable safety culture,” says Dr. Rayment.

Retrofitting plants with new parts, systems and technologies is today’s transformative change. And, the future holds further promise as innovative, advanced reactor designs change the paradigm yet again.