





# Generation next: Velan forges ahead in nuclear

## A leading supplier of valves to a wide range of industries for almost 60 years, Velan is ready for the resurgence in nuclear power

Leaf through almost any newspaper these days, and chances are you'll find a headline announcing the nuclear "renaissance". Hyperbole aside, there's little doubt that the nuclear industry is coming out of a multi-decade moratorium, as nations on almost every continent look to nuclear energy as a safe and cost-effective way to address their burgeoning energy demands. With this in mind, we met with the Velan team – a company on top of the latest trends in valve applications – to discuss their leadership role in helping promote safety and reliability in the nuclear industry.

*By David Sear and Joanne McIntyre*

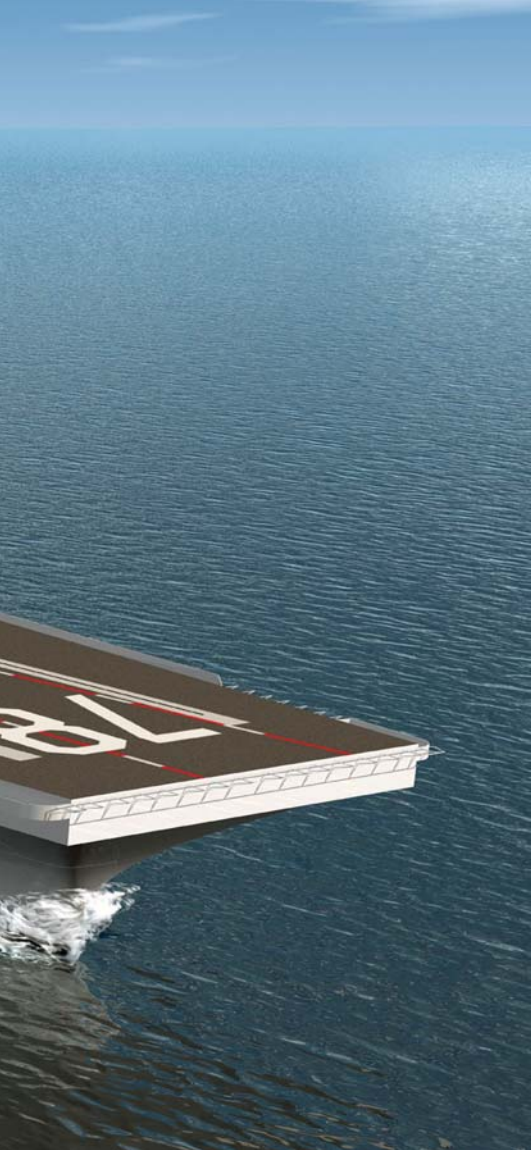
For Velan, the potential of nuclear power isn't news. After all, the company has been designing and manufacturing valves that meet the exacting criteria of the nuclear industry since it began doing business in the 1950s.

Velan's involvement with the nuclear industry was launched in the early 1950s with the US Navy's first nuclear-powered submarine, the *USS Nautilus*. It was a particularly good fit for the young

company, given founder A.K. Velan's emphasis on quality and reliability with design innovation.

"Our relationship with the US Navy has been a highly collaborative one," says Mr Velan. "Over the years, we've pioneered many valve technology innovations that have later become standards in a wide range of industries. For example, the Navy was quick to standardize on forged valves up to 24" because of their greater strength and reliability. These forged

valves have since found widespread preference in fossil power plants, commercial nuclear power plants, and in super-critical power plants in particular." Emissions were a major concern in the nuclear industry long before they became a more general environmental concern. To address zero-leakage requirements, Velan R&D developed the first bellow seal valves in the 1950s as well as the first live-loaded packing chamber in the early 70s. In later years, the focus of the R&D



**Velan valves will report for duty on board the next-generation *USS Gerald R. Ford*-class aircraft carrier, featuring a new nuclear propulsion plant and technologies that revolutionize flight deck operations and greatly reduce manning. (Illustration credit: Northrop Grumman Newport News.)**

effort was directed at minimizing the fugitive emissions from standard packing chambers.

### **It's all about safety and reliability**

From day one, the prime objective in design and manufacture of Velan valves has been ensuring absolute standards of safety and reliability. As A.K. Velan explains, "Nuclear power generation has always been a particularly challenging application for valves. The goal in this industry is to maximize power production while ensuring there is no exposure to the radiation and contaminants inherent in this process that might pose a potential threat to public safety and health. Valves play a major role in the day-to-day operations of nuclear power plants for the generation of

electricity or for propulsion of nuclear submarines, aircraft carriers, and other military vessels that use it to produce steam. In this environment, not only must valves manage critical control points in the process such as the flow of the coolant, water, steam, and other auxiliary systems of the plant, they must do so reliably over a considerable period of time – as much as 60 years in some cases."

Velan's model of collaborative development began early in the 1950s and 60s. Over the years, the company has worked with a number of nuclear organizations including the US Navy, Atomic Energy of Canada, AREVA, and Westinghouse and utilities such as Duke Energy and Ontario Power Generation to establish new levels of safety, reliability, and maintainability of nuclear valves, and electric actuators. Recently, Velan has been at the forefront of qualification testing to address safety issues raised by the Nuclear Regulatory Commission (NRC) and Electric Power Research Institute (EPRI). To ensure that critical motor-operated valves close during "worst case" scenarios, Velan worked closely with Duke Energy and others to design and rigorously test special gate valves that can accommodate larger and heavier actuators that provide greater access for installation of thrust and torque sensors on the stem.

### **A strong global player**

As Velan continued to augment its product offering in the USA and Canada, it also expanded its global reach. As the nuclear industry flourished in the 70s, the company established a joint venture to manufacture nuclear valves in France in 1974. Alstom-Velan subsequently acquired the nuclear valve manufacturing plant of Sereg and combined operations in Lyon. In 1999, Velan took over full ownership of the Alstom-Velan joint venture and also acquired Bouvier-Darling, another French nuclear valve company. In 2007, Velan further strengthened its nuclear expertise and product range when it acquired a majority of Segault, a French valve manufacturer that has been a supplier to

the French nuclear reactor program since the early 1960s. Segault is also a key supplier to the French nuclear navy for both submarines and aircraft carriers. These last two acquisitions added main steam isolation valves, instrumentation valves, solenoid valves, and safety valves to Velan's nuclear valve offering. Today, Velan has 13 manufacturing plants across North America, Europe, and Asia, as well as a brand new plant that will soon start production in China, Velan's largest overseas export market. Velan's application expertise has expanded well beyond the world of nuclear power to include power generation in general, refining and petrochemicals, chemicals and pharmaceuticals, oil and gas, pulp and paper, mining, cryogenics, and almost any other industry with demanding valve applications.



Mr A.K. Velan next to one of Velan's valves.

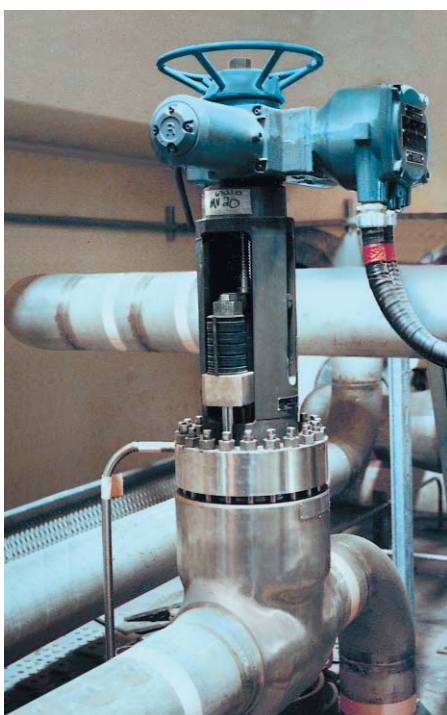
Velan's Lyon - France plant is 15,000 sq metres in size and specializes in nuclear gate, globe, and check valves and cryogenic butterfly valves for LNG terminals and carriers.



### Welcoming in the next generation

Currently, about 85% of the world's nuclear electricity is generated by reactors derived from designs originally developed for naval use. These and other second-generation nuclear power units have been found to be safe and reliable, but they are being superseded by new and more advanced designs.

Among the most interesting advances currently underway are the Generation 3+ nuclear plants. These new plants incorporate evolutionary improvements in fuel technology, passive safety systems



A Velan bolted bonnet gate valve in a PHT transfer system in a CANDU nuclear reactor.

(which do not require operator action or electronic feedback to shut down safely in the event of an emergency), modular construction protocols, and standardized design. The first Generation 3+ plants are in operation in Japan and others are under construction or ready to be ordered. Generation IV designs are still on the drawing board and will not be operational before 2020 at the earliest. The Velan engineering and manufacturing team has a proud record of having manufactured more than 200,000 nuclear valves over the years. Today the team, which started developing valves for the new European Pressurized Water Reactor (EPR) valves in 1996, is hard at work furnishing valves to the first Generation 3+ EPR plants, TVO's Olkiluoto 3 and the new unit at EDF's Flamanville site. Velan is producing a wide range of valves for these projects including three-way globe valves in large sizes, high-pressure gate valves, and wide use of RADUR/RAMA bellows seal valves. All of these valves address industry cobalt-free requirements (to reduce costs and hazards associated with potential radiation exposure to activated cobalt wear debris), are designed to be low maintenance, and have a projected lifetime of 60 years.

"This is an extremely exciting time to be part of the nuclear industry," says Michel Monier, Nuclear Manager, Velan (France). "We're supplying valves to some of the most advanced applications in the world. One of the latest is South

Africa's Pebble Bed Modular Reactor (PBMR), a High Temperature Reactor (HTR), with a closed-cycle, gas turbine power conversion system. This project is internationally regarded as one of the most promising technologies in nuclear power: it offers very high efficiency and meets the high safety levels expected of advanced nuclear designs."

### Putting Velan's stamp on the nuclear industry

With an installation base covering the majority of the world's nuclear power plants, spanning five continents, and over 2,000 thermal power plants, Velan is a global market leader in power industry valves. Over the years, Velan has worked with just about every valve standard out there.

In fact, even before ASME introduced its N stamp for nuclear valves, Velan's quality program was held to extremely stringent internal standards. In 1970, Velan became the first valve company to receive the ASME N stamp accreditation, and is one of the very few valve companies to have maintained this important North American nuclear standard for the last 37 years.

### Meeting the challenges of the future

To succeed in the highly competitive world of valve design and manufacturing, a company must combine proven design and manufacturing expertise with advances in technology. According to Don Bowers, Velan's US Director of Sales

for Power, consistently producing top-quality, highly reliable valves has been business as usual for over 50 years at Velan. "Our longevity and consistency definitely work in our favor these days," says Mr Bowers. "The majority of the existing nuclear plants worldwide are nearing full maturity, and the challenge is to properly maintain them so they'll continue producing safely and efficiently. When it comes to replacing or upgrading components in their plants, plant managers want to work with manufacturers who are in this business for the long haul. Our customers know that when they deal with Velan they benefit from the incremental expertise that only a large, focused organization that's been around for decades can provide. Simply put: they know they can count on us."

The other side of the coin is embracing innovation. Today, challenging projects are popping up everywhere from a coal gasification and liquefaction unit in China to mining operations in New Caledonia and refining in the Albertan tar sands. And the Velan relationship with the US Navy is still going full speed ahead: Velan recently supplied valves for the Nimitz class aircraft carrier, the *USS George H.W. Bush (CVN77)*, and is now working on several projects for the new *Ford-class* aircraft carriers. "There are a lot of new concepts the Navy wants to incorporate into their next generation fleet of aircraft carriers, such as titanium butterfly valves and Inconel ball valves, says Don Bowers. "In a way, these projects are both a continuation of our proven legacy and a promise for our future. It's a nice mix." This sense of excitement is shared by Tom Velan, President of the company. "Thanks to my father's technical expertise and entrepreneurial spirit, we were early participants in the birth of the nuclear valve industry. Today, we're well positioned to be part of the coming resurgence.

"We've gained a great deal of invaluable experience by working in the nuclear industry for so many years. Our R&D, design, and manufacturing processes were all defined by the stringent standards of the nuclear industry and we



Frédéric Segault, the President of recently acquired Segault SA, a supplier to the French nuclear reactor program since the early 1960s.

have always tried to apply that experience to other markets, be it for power generation, chemical and petrochemical, oil and gas, coal liquefaction, pulp and paper, mining, cryogenic, or the ship-building industries. It's all about ensuring consistently safe and reliable performance over time."



Velan supplied the first contract for nuclear bellows seal valves in 1958. Today's EPR RAMA bellows globe valve is cobalt free and offers state-of-the-art fugitive emissions control and in-line reparability.