

Fast reacting Stromag brakes ready for Hinkley Point C nuclear power plant

A key component of the UK Government's net zero emissions strategy, two new nuclear reactors at Hinkley Point C are currently under construction by EDF Energy. Stromag has supported the project by delivering specialised brakes for multiple cranes at the site, including those that will lift radioactive uranium fuel rods from the very heart of the reactors.

Located in Somerset in the South West of England, EDF is constructing two European Pressurised Reactors (EPRs) at Hinkley Point C. Once complete, the third generation advanced pressurised water reactors will provide clean energy to approximately six million homes.⁽¹⁾

The construction of a nuclear power plant is a huge undertaking requiring a wide array of construction equipment – especially heavy-duty cranes. Multiple crane OEMs supplying the project have enlisted Stromag to provide specialised braking systems, each designed to offer the performance and reliability required for this strictly regulated application environment.

A nuclear crane expert

Stromag is a global manufacturer of high-performance braking systems for cranes and hoists. A leading brand of Altra Industrial Motion Corp., the business has a proven track record in supplying braking systems for nuclear applications.

Michel Donnay, Plant Director of Stromag's French facility in La Guerche Sur L Aubeois, expands: *"Our braking technologies are proven in nuclear facilities across Europe and Asia. We are very familiar with projects that involve the construction of this new generation of EPRs. Therefore, crane OEMs have approached us to provide brakes to support construction of the machinery and pumping stations at Hinkley Point C. However, the primary challenge was to specify multiple braking systems for the nuclear fuel transfer systems - the most critical cranes in the entire facility."*

Lifting the reactor's heart

Nuclear reactors rely on uranium fuel rods, inserted into the core, to generate heat via nuclear fission. However, like any fuel, the rods eventually become depleted and require replacement. This is carried out by a fuel transfer system inside the reactor building.

The system is comprised of heavy-duty cranes that lift out spent fuel rods from the reactor when it is offline. These rods are lowered into a separate cooling pond. Then, new fuel rods are inserted into the core and fission can restart. Lifting heavy, radioactive uranium fuel rods is an incredibly dangerous process, with power transmission components installed on the cranes required to offer incredibly high levels of reliability and redundancy.

At Hinkley Point C, this operation will be carried out by a huge circular crane located inside the reactor building, a so called a polar crane. Used once or twice a year, the crane is designed to have a lifting capacity of 300 tons. To ensure the crane stops with the maximum reliability and redundancy, the crane OEM selected Stromag to provide the service brakes and emergency brakes for the design.

Service and emergency brakes

"The crane in the reactor building requires two braking systems," explains Jonathan Balland, Area Sales Manager at Stromag. "Service brakes carry out the normal braking operations for the crane when it is in use. These units are usually mounted on the high speed shaft. Emergency brakes are mounted on the drum and offer highly responsive stopping performance if the load falls for any reason."

For service braking, Stromag specified its C range of electromagnetic disc brakes. Rated for over four million cycles in normal operating conditions, the electromagnetic design eliminates any risk of hydraulic fluid leakage, maximising reliability. The brake only opens when power is applied, staying closed otherwise. Once powered, only a small current is required to keep the brake open, which ensures low energy consumption in operation.

Hydraulic brakes are preferred for emergency braking applications due to the higher torque figure this configuration can achieve. While the world's largest electromagnetic brakes can reach up to 10 tons clamping force, there is almost no limit to what hydraulic brakes can achieve, with some in mining applications reaching up to 100 tons of force. This exceptional performance is critical for the polar crane at Hinkley Point C, ensuring that the heavy radioactive fuel rods can be stopped dead. To meet these application requirements, Stromag specified SH hydraulic disc brakes.

"The key with the emergency brakes is to stop the load in the shortest distance possible. Our SH32 brake offers a 32-ton clamping force, but critically, with a closing time of less than 0.3 seconds. This ensures we can offer a reduced minimum distance of travel for the load if it begins to fall. For example, the braking systems may be required to stop 300 tons of load within 50 centimetres of travel."

"For an application as critical at the polar crane at Hinkley Point C, we also had to offer extra clamping force to ensure the required redundancy, which we achieved by specifying multiple units. If a brake fails for whatever reason, another unit can provide the necessary performance to halt the load."

Jonathan adds.

In addition to the brakes, Stromag also supplied couplings, limit switches, hydraulic power units (HPUs) and monitoring systems.

Exacting standards

Stromag ensures the suitability of its braking systems for all customer applications thanks to rigorous testing and modelling. However, providing braking systems for the nuclear industry requires achieving the highest possible standards.

Michel says: *"As a specialist in nuclear applications, we are accredited to the highest quality specifications. EDF has certified our applicable products as C3, which denotes suitability for use in all buildings at a nuclear power plant. We undertake customer surveys, independent consultations and assessments to define our critical steps and certify that all aspects of engineering work are carried out correctly. Typically, the quality documents we supply for products used on critical cranes in nuclear power stations can reach up to 1000 pages long."*

"We carry out all engineering work in-house at our facility in France, while offering our crane OEM customers technical support at their production facilities too. We are among a handful of companies worldwide who can provide these braking systems for critical nuclear applications."

Image Captions:

Image 1: The construction of a nuclear power plant is a huge undertaking requiring a wide array of construction equipment – especially heavy-duty cranes. (Image Source: Adobe stock – 192237200)

Image 2: Stromag braking technologies are proven in nuclear facilities across Europe and Asia. (Image Source: Adobe stock – 22340770)

Image 3: Stromag provided brakes, couplings, limit switches, hydraulic power units (HPUs) and monitoring systems.

(1) <https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c>

About Stromag

Founded in 1932, Stromag has grown to become a globally recognized leader in the development and manufacture of innovative power transmission components for industrial drivetrain applications. Stromag engineers utilize the latest design technologies and materials to provide creative, energy-efficient solutions that meet their customer's most challenging requirements.

Stromag's extensive product range includes flexible couplings, disc brakes, limit switches, an array of hydraulically, pneumatically, and electrically actuated brakes, and a complete line of electric, hydraulic and pneumatic clutches.

Stromag engineered solutions improve drivetrain performance in a variety of key markets including energy, off-highway, metals, marine, transportation, printing, textiles, and material handling on applications such as wind turbines, conveyor systems, rolling mills, agriculture and construction machinery, municipal vehicles, forklifts, cranes, presses, deck winches, diesel engines, gensets and stage machinery.

Editor Contact

DMA Europa Ltd : Philip Howe

Tel: +44 (0)1562 751436

Fax: +44 (0)1562 748315

Web: www.dmaeuropa.com

Email: philip@dmaeuropa.com

Company Contact

Stromag : Patricia Ullrich

Tel: +49 2303 102239

Web: www.stromag.com

Email: patricia.ullrich@stromag.com