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Mitsubishi Electric Verifies VP-X High-efficiency Turbine Generator

World's first 900-MVA-class turbine generator to use indirect hydrogen cooling

TOKYO, December 8, 2014 – [Mitsubishi Electric Corporation](http://www.mitsubishielectric.com) (TOKYO: 6503) announced today the successful completion of verification tests on its VP-X turbine generator for thermal power plants, the world's first generator in the 900 MVA class to use indirect hydrogen cooling for stator conductors. Cooling is achieved with hydrogen gas introduced from outside of the main insulation. Thanks to this and other proprietary technologies, the VP-X achieves an extra-high efficiency rating of 99%, placing it in the world's highest class of turbine generators that offer highly sustainable operation. A series of VP-X generators will be launched commercially in April 2015.



VP-X high-efficiency 870 MVA generator used for verification

Cooling method	Generator Capacity [MVA]					
	200	400	600	800	1000	1500~
Air-cooling	[Grey bar]					
Hydrogen-cooling (indirect)		[Red bar]				
Water-cooling				[Blue dashed box]	[Blue solid box]	

Lineup of two-pole turbine generators

Mitsubishi Electric enhanced cooling performance in the VP-X by improving main insulation and cooling gas ventilation without incorporating a water-cooling system for the stator winding. Until now, all large-capacity turbine generators in the 900 MVA class have relied on water-cooling.

Mitsubishi Electric's VP-X also boasts a simplified design that will help improve the appearance of power plants, as well as lower the requirements for maintaining and operating turbine generators. The overall size is 20% smaller than conventional indirectly hydrogen-cooled generators. In addition, both the footprint and frame diameter are smaller, making transportation easier. Elimination of a water-cooling system for the stator winding helps to simplify maintenance. Also, needs for manual inspection have been reduced through a partial discharge monitoring system that incorporates a microstrip antenna for continuous monitoring of the main insulation and an inspection robot.

In addition, a new parallel-manufacturing method for the stator core and stator frame shortens delivery time.

VP-X 870 MVA Turbine Generator (verification model)

Maximum capacity:	870 MVA
Power factor:	0.90 (lagging)
Rotating speed :	3,600 min ⁻¹
Frequency:	60 Hz
Number of poles:	2
Efficiency:	99%
Cooling system:	Indirect hydrogen-cooling

The VP-X turbine generator received a 2014 Good Design Award from the Japan Institute of Design Promotion, making this the first large electrical machine for power systems to be so honored. The Good Design Award, launched in 1957 as Japan's leading comprehensive program for recognizing outstanding design, attracts entries from companies and designers worldwide. The award's G Mark symbol is widely recognized as the mark of superior design.

Mitsubishi Electric has shipped more than 2,000 turbine generators worldwide since 1908.

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About Mitsubishi Electric Corporation

With over 90 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded consolidated group sales of 4,054.3 billion yen (US\$ 39.3 billion*) in the fiscal year ended March 31, 2014. For more information visit <http://www.MitsubishiElectric.com>

*At an exchange rate of 103 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2014