



NOKIAN CAPACITORS

NEWS

MORE POWER

1/2006

NOKIAN CAPACITORS LTD. OPENED A NEW FACTORY IN TAMPERE (30.11.2005)



Nokian Capacitors Ltd. have finalized the factory investment for reactors, which are used in Transmission and Distribution networks. The new factory is 4000 square meters with high-tech automation production systems and testing spaces. Nokian Capacitors intend to double its reactor production in the next few years and estimate that the venture will create over 20 new jobs. During 2000-2005 the company's turnover more than doubled. At the same time, the number of personnel has increased by 80 to 215 in total.

The company chose Tampere as the factory's base location for a complete, flexible, and global service. The customer benefits, when Finnish know-how in designing, production, project operation and sales function effectively in close collaboration. As a result, the company will achieve high quality products, competitive prices and on time deliveries to the market through its the global network. Over 90% of the new factory's production is exported to markets as far away as Australia, Brazil, Ukraine, USA and China.



GROWING NEED FOR ELECTRICITY WORLDWIDE

The demand remains at a high level

From a sales director's perspective, the outlook for Nokian Capacitors for the next two years is moderate to excellent.

In industrialized countries, electricity consumption continues to grow steadily, in businesses as well as households. European countries are trying to cope with the situation by building and reinforcing transmission networks between them. This was made possible by the liberation of the European electricity market a few years ago, though individual countries have applied differing schedules in removing restrictions on their electricity production, distribution and sales. Growing cross-border transmission of electricity is a positive trend, improving the market for our products. It seems, however, that the rising consumption demands cannot be met with mere transmission tricks. Production must also be stepped up.

Fast developing countries continue to invest heavily in infrastructure required by the production and transmission of electricity. The most promising growth prospects are in Brazil, India and China.

Overall, the global market for high-voltage products is on the increase, while the market for low-voltage products is growing at a clearly calmer rate. The level of industrial investment in our important domestic markets in Finland and Sweden, for example, is currently rather low. However, growth seems to continue at least in China, where we have succeeded in securing a firm foothold in the hotly contested market over the last few years.

Growing demand eases the tough global competition and even opens up possibilities to increase market shares. Thanks to our timely completed plant expansion we are well-placed to capitalize on the booming market in the next few years.



Risto Tuominen
Sales Director

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Internationalization Award of the President of Finland to Nokian Capacitors Ltd.



Nokian Capacitors Ltd. has received the year 2005 Internationalization Award from President Tarja Halonen.

In the presentation ceremony on 14 February 2006, President Tarja Halonen said that know-how, innovations, efficient application and commercialization of new technologies are key words in internationalization. The award-winning companies have understood the importance of these success factors in an exemplary manner. The award ceremony was held in the Presidential Palace and Nokian Capacitors was represented by Chairman Seppo Ahonen, Managing Director Kari Tuomala and Sales Director Risto Tuominen. "We are proud of this accolade and it will spur us on to ever-greater achievements", said Kari Tuomala. "Our strengths are high technological competence, flexibility and well-functioning partnerships in our major market areas".

The recipients of the Internationalization Award, organized by Finpro, have been assessed on the following criteria:

- ability to develop and apply new kinds of products and approaches
- success in the company's chosen business areas
- significance of growth opportunities
- expertise in the management of internationalization, growth and risks especially in business management, marketing, technology and risk financing
- ability to cooperate in national innovation environment
- impact on the improvement of Finnish knowhow, quality and employment

MaxSine active filters improved power quality and productivity at Kymen IV-Valmistus Oy in Finland

In 2001 Kymen IV-Valmistus Oy acquired a new longitudinal seam-welding machine in order to improve productivity, product quality and shorten lead times in the face of increasing demands. At the commissioning of the new machine the company faced some problems.

- Welding made the lights flicker at the factory and computer displays were disturbed, says production manager Sami Virtanen.
- The uptime, quality and control properties of the new investment did not meet our expectations. Therefore, we contacted Nokian Capacitors and asked their experts to come and measure the power quality at our plant. They identified the problem promptly, explained how it could be solved, and supplied a turn-key solution.

Dynamic grid load was the problem

The welding machine is connected between two phases in a 400-V grid. The maximum output is 145 kVA. The measurements showed that the load was extremely dynamic. The welding process consists of successive welding periods (five 100 ms periods) and rest periods (three 60 ms periods). During the welding period, phase voltages 1 and 2 dropped by up to 15 V, which caused the lights to flicker and prevented other equipment from working properly. The measured values of the load were: $S = 87$ kVA, $P = 55$ kW, $Q = 67$ kVar and $I_{rms} = 236$ A. Voltage sags were caused by the high dynamic load, which resulted in voltage drops in network impedances.

Solution: MaxSine shunt active filters

- We proposed to solve the problem with a real-time reactive-power compensation shunt MaxSine active filter, says production engineer Janne Kiviranta from Nokian Capacitors.
- MaxSine is an electronic shunt active filter developed by us, in which harmonic filtering and reactive-power compensation are based on direct flow control. We specified two active filter units, model MaxSine 100A-3L, to correspond to the total load of the welding equipment. Now the capacity is high enough to temporarily compensate even the active power consumed by the load.

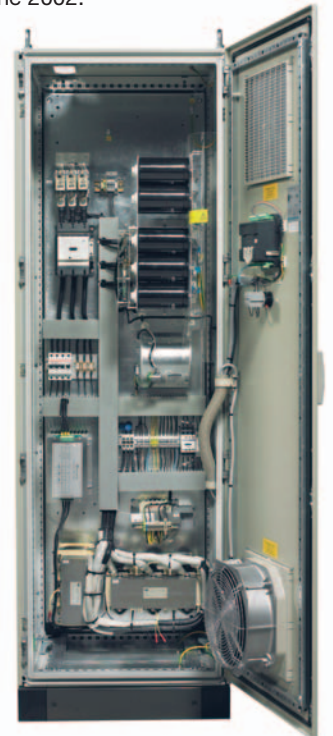
The active filters were connected parallel to the load. For load measuring, current converters were installed in phases 1 and 2. At the time of MaxSine's commissioning, grid measurements were

- made while the welding machine was being operated normally.
- With the active filter installed, the voltage only dropped by 3 V, and the one-phase load was balanced into a three-phased load. The lights ceased to flicker and worked without disturbances, says Kiviranta.
 - Using the active filter it was possible to reduce active power by 40% for selected welding materials and still reach the required mechanical strength of the welding. That reduction reduced the cuts of the welding wire resulting in much higher availability of the welding machinery.

According to production manager Sami Virtanen, the welding machine has been operating without problems since the installation of the MaxSine active filters in June 2002.

- We have been able to improve the efficiency of our production according to plan. Our productivity has improved, our product quality is better, and our lead times are shorter.

Kymen IV-Valmistus Oy employs 20 people in the manufacture of industrial air conditioning ducts. The company's net sales are around two million euros. A part of the production goes indirectly to export. Most of the process consists of sheet work and welding.



MaxSine active filters being installed at Kymen-IV-Valmistus.

Power factor controller with data transfer capability

Nokian Capacitors has developed an advanced-technology power factor controller, which measures grid status while controlling the capacitor bank. Through an optical interface, this NC-12 can be connected to industry architecture or public data networks, whereby the measurement results can be monitored anywhere. The product has been in production for a year and has been very well received by customers.

Efficient grid monitoring

For continuous monitoring of the distribution network and capacitor bank, the NC-12 can be connected to an NC-Watch remote monitoring device. Monitoring provides real-time values of the voltage, voltage distortion, current, effective power, reactive power and bank temperature. Clear text and symbol messages, alarm recording, graphics and a multi-language user interface ensures quick and easy monitoring.

Nokian Capacitors supplies the entire NC-Watch remote-drive system complete with integration into the data network. It is also possible for the customer to order only the components of the remote-drive system and connect it to the data network and other control systems themselves.

The NC-Watch remote monitoring device consists of three components, which communicate between themselves. For example, the regulator sends data through an optical fibre to the adapter, which accommodates the incoming data to the Modbus data transfer protocol. Through the Modbus the NC-Watch is integrated into the customer's data transfer network.

Higher performance

The new NC-12 optimizes reactive power compensation. Continuous grid monitoring combined with the automatic settings

of the regulator guarantee optimal compensation and faultless power quality even in rapidly changing conditions. The applications of the NC-12 cover automatic regulation of the capacitor banks in both low and medium voltage distribution systems.

Saves time and money

Thanks to access to real-time measuring values, unfavourable conditions and problems will be detected in time. Breakdowns will be shorter and maintenance schedules can be fixed in advance, which reduces production losses and maintenance costs. The measurements reveal any areas that need to be developed in the distribution network, and the planning of future projects becomes much easier.

Reactive power compensation improves power quality, which helps save energy. Therefore, improved compensation always leads to lower energy costs.



A completed
11 kV 5 Mvar
bank



Transmission network bottleneck relieved



Two 22 kV 5 Mvar bank under construction

Nokian Capacitors Australia are providing a solution to Western Power to increase transmission network capacity. Western Power is the generation, transmission and distribution utility of Western Australia, covering an area approximately eight times, and a population of less than half that of Finland (Finland: 338 000 sqm and 5,2 million people).

The majority of electrical load and generation is located south of Perth, the state capital, and the metropolitan network has evolved to suit this arrangement. Several large wind generation projects have recently been commissioned to the north of Perth. The wind farms require substantial reactive power support to enable the transfer of their power via the 132 kV network in that area.

Western Power is alleviating these constraints and providing local voltage support by installing several 11 kV and 22 kV capacitor banks in the zone substations in the 132 kV network. The 11 kV banks are rated at 3 Mvar and 5 Mvar, and the 22 kV banks are rated at 3 Mvar, 5 Mvar and 30 Mvar. All the banks are detuned to avoid harmonic resonance between the capacitor banks and system impedance. The extent of detuning is 4.5% and is achieved by use of series connected air core reactors. The use of substantial series reactors also enable multiple banks to be installed within the same substation without the risk of excessive inrush currents when energizing parallel connected banks.

Nokian Capacitors' scope of supply is the design, manufacture, works testing, packaging, documentation, insurance and delivery to Perth. Equipment is supplied in pre-assembled packages to facilitate site erection by Western Power's employees and sub-contractors. Packages include capacitor units mounted in racks, foundation beams, support insulators and unbalance protection current transformers. The banks are configured as ungrounded double star arrangements.

All bank designs were approved by Western Power and have to comply with rigorous physical layout and performance criteria. Application of the banks depend on the distribution voltage of the zone substation, the fault level at that voltage, and hence the expected voltage variation when a bank is switched, the availability of space and suitable switchgear, and the amount of reactive power that is required at that node in the network.

Installation of the banks is phased to match the increased wind generation capacity. So far, 2 banks of 3 Mvar and 5 banks of 5 Mvar have been installed at 11 kV, and 2 banks of 3 Mvar and 45 banks of 5 Mvar have been installed at 22 kV. One 30 Mvar, 22 kV bank has been installed. Another 31 banks are on order and will be commissioned during 2006 and early 2007.

New office in the USA



Clapham substation

The compensation market in the USA is very attractive. We are establishing a new office named Nokian Capacitors USA Inc. in Texas to address the attractive compensation market in the USA and to offer customers the best possible service through direct contact with the factory.

We continue our marketing efforts with our partner PEI (Power Engineers Inc.), the largest T&D engineering company and most comprehensive compensation consultant in USA.

The ongoing SVC project at TriState is entering the commissioning phase and the SVC project at Niagara Mohawk (National Grid, NY) continues in the planning phase.

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