



## ZTR has entered the USA market

PJSC "ZTR" has performed the contract on the delivery of the transformers for the solar power-station Solana (USA). Two transformers rated for power 200 MVA voltage 230 kV and two transformers rated for power 58 MVA voltage 230 kV will be supplied by ZTR in accordance with the contract conditions.

Equipment was dispatched in November 2011. Implementation of the object operation is scheduled for the year 2013. General contractor of the PJSC "ZTR" customer was Abener Engineering and Construction (USA), included into group of Abengoa companies.

Solana station will become one of the largest solar power-station rated for power 250 MW, which will be opened in the year 2011, close to Dgila Bend in the southwest of Phoenix, Arizona state, USA. At the operation with total output station will produce energy, which will be used by 70 thousand consumers.



PJSC "ZTR" has also executed the contract on the delivery of the furnace transformer rated for power 9 MVA voltage 13.8 kV for metallurgical plant Feliman Production, Western Virginia state, Letart, USA. "Serious pre-qualification operation and audits, which confirmed high quality of ZTR production resulted to the appearance in the USA market and contract signing, -mentioned General Director of PJSC "ZTR" Igor Kleyner. – Delivery of ZTR equipment to the USA is significant event not only for our company. Ukrainian company exporting equipment of high quality has appeared in the one of the most powerful markets in the world".

The first delivery of PJSC "ZTR" equipment was in the year 1972. Transformer rated for power 560 MVA, 345/120 kV was delivered for the distribution company, Detroit city.

## Insulation production is to be modernized by ZTR

*The price of the new equipment is made up USD 710 thousand*

Two machines with computer numerical control for the laminate cardboard treatment were put into operation at PJSC "Zaporozhtransformator" within investment program for improvement of conditions and efficiency of labour. The contract for the purchase of four side longitudinal-milling machine for the insulation production was signed in November.

Machines are intended for the treatment of new multilayered material – "laminate" based on cardboard, glued by synthetic binding agent. The first machine, that treats center by means of computer numerical control is ROVER C9.50, intended to treat laminate was put into operation in October of the current year. For the present time insulation part lot for the current factory orders was manufactured, operators and developers of the program were trained. Supervision and setup-and- adjustment works of the second machine, center is cut by computer numerical control WNT-750 started in November of the year 2011. The first treatment of cutting mode of laminate plates will be performed in the nearest period.

During the selection of manufacturer, PJSC "ZTR" selected well-known company



BIESSE (Pesaro, Italy) of production of special machines for woodworking and plate materials. «Mounting and setup-and-adjustment works are performed by qualified specialists of BIESSE company, - mentioned Chief Technologist of PJSC "Zaporozhtransformator" Vyacheslav Valchuk. – Workers of the enterprise will be trained on the new high technological equipment, that will permit to execute assigned qualitative tasks qualitatively».

Longitudinal-milling machine Superset XL (Italy) with the system of the rapid change of tool HSK80, which ZTR planned to implement up to the end of the year, will permit to manufacture insulation parts (rods) made of laminate cardboard with the improved qualitative and precision characteristics. Reduction of tolerance during the manufacturing of rods will permit to reduce insulation distances, outline dimensions and transformer mass.

The price of the new equipment for insulation production made up USD 710 thousand. Implementation of new equipment – is one step for improvement of ZTR production competitiveness, quality and reduction of labour intensiveness.



# Unique ZTR equipment for the intelligent networks

Recently stabilized world tendency of the price growth at the energy carrier is observed and it is resulted to the growth of electric power price.

That's why economy of electric power is of great importance. The wide implementation of the controlled AC transmission lines is one of the main decisions for realization of this goal. The main purpose of the controlled AC transmission line application is increase of the permitted field of existence of steady-state condition of electric power system.

It could be achieved by means of range expansion of transmitted power, optimum distribution of the active power flow, compensation of reactive power.

PJSC "Zaporozhtransformator" produces equipment for the controlled transmission lines (intellectual networks) as well as controlled reactors, phase-shifting transformers, monitoring systems and control of intelligent transformers. The present issue of the informational bulletin ZTR-inform is devoted to the controlled shunt reactors (CSR) for the intelligent networks of two type design version (saturating and transformer).

Controlled shunt reactors (CSR) is considered to be the type of FACTS equipment (controlled equipment for the AC electric networks) and the statistic equipment of shunt type with smoothly regulated inductive resistance. Controlled shunt reactors manufactured by ZTR

are intended for automatic control of the reactive power and stabilization of the voltage levels; it permits to remove daily and seasonal voltage oscillation in the electrical network, increase the electric power quality, optimize and automate conditions of the electrical network as well as decrease losses of electric power within its transportation and distribution. CSR provides growth of energy system stability and improve operation condition in ten times.

PJSC "ZTR" produces controlled shunt reactors for the intelligent networks of two types of design version (saturating and transformer), - tells the chief design of PJSC "ZTR" Sergey Ukolov. - Equipment for intellectual networks permits to keep system in operation without human interference due to the autoimmunization of machines".

Principle of action of CSR of the saturating type is to be in by-turn saturation of semi-legs of electric magnetic parts (EMP), though

saturation degree is specified by the meaning of rectified current running in the control winding. Changing of saturation degree of semi-legs caused to the changing of EMP inductance. The larger is saturation degree, the less is the inductance and inductive resistance accordingly. It caused to the current change in the network winding and therefore to the change of the reactive power consumed from the network.

The following components belong to the main parts of the CSR of saturating type:

Electromagnetic type is similar to the power transformer. The main difference is existence of two magnetic system semi-legs per phase. EMP at

least consists of two windings: network winding (NW) and controlled winding (CW). There is also the variant with the existence of EMP with three windings, where the compensation winding (CW) is added to the NW and CW; it is used to suppress the third current harmonic and power supply source of

semiconducting converter.

One or several semiconducting converters with the feeding transformers (TMP) which provide the rectified current flow in CW of EMP, value of which is specified the magnetic system condition.

Automatic control system (ACS) provides voltage keeping in the connection point at the specified level or specified current (power) flow across NW of reactor.

The following components belong to the main parts of the CSR of transformer type:

Electromagnetic part is considered to be three phase transformer, containing three windings: NW connected to the external network, CW connected to the controlled thyristor unit (power of thyristor unit is equal to power of electromagnetic part), CW connected to the filters of the highest harmonics. Mentioned windings are arranged at the closed shell-core type (5-legs) of magnetic system (MS) in the following order (from the leg): CW, CW, NW.

One semi-conducting converter, connected to the terminals of CW.

Filters of the highest harmonics connected to CW.

ACS, connected to the thyristor converter, current transformers, NW of electromagnetic part, voltage transformers of substation and to ASUTP substation.

