Institution Project Center ITER
Russian Federation Domestic Agency

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Chepetsk Mechanical Plant: mission completed.

Project Center ITER, Moscow (December 03 2014) – December 03 2014 specialists of JSC "ChMP", which is a part of "TVEL" Fuel Company, made shipment of the last batch of superconducting strands for the ITER magnetic system. With this, the mission of Chepetsk Mechanical Plant (Udmurtia) in implementation of the International ITER Project is successfully completed. The batch of conductors shall soon arrive at the JSC All-Russian Research and Development Institute for Cable Industry (VNIIKP), where cabling of cables for toroidal and poloidal magnetic fields will be carried out.

JSC "ChMP" successfully dealt with its task within six years. During this time the plant manufactured approximately 100 tons of niobium-tin strands for the toroidal field conductor, and approximately 125 tons of niobium-titanium strands for the poloidal field conductor of the future facility. Still, these numbers identify not only the fact of fulfilment by Russia of its obligations under the international agreement. Fulfilment of this task is an example of revival of the country's industrial capacity, because the superconductor fabrication line on the territory of Udmurt gigantic plant was started almost from scratch.

Industrial production of superconducting strands in the USSR was arranged in late sixties of the last century in Kazakh SSR. At the beginning of nineties demand for superconductors decreased greatly due to collapse of the USSR and severe economic crisis that involved almost all of republics of the former Soviet Union, so the fabrication was practically lost. Luckily, the specialists of the Bochvar Institute (JSC "VNIINM") managed to preserve and even improve manufacturing process of niobium-titanium and niobium-tin strands. Participation of Russia in the ITER Project and its duties allowed recovery, or in fact new creation of the high quality superconductor manufacturing line in as short a time as possible.

Chepetsk Mechanical Plant is Russia's largest manufacturer of the items made of zirconium alloys, natural and depleted uranium, metallic calcium, and its compounds. This plant was selected due to several factors: high production factors, professionalism of the personnel, developed infrastructure, modern capacities. To arrange production process of superconducting materials for ITER ChMP has purchased more than 100 items of the modern equipment from the leading suppliers. Official start of the manufacturing process took place April 23 2009, in 2010 the plant reached the level of industrial-scale production.

Many technological and organizational issues were successfully solved in the cause of production process development. It is necessary to note that the strand itself is a piece of technical art. Strands for ITER are unique composite items consisting of more than 10.000 finest (2-6 microns) superconducting filaments. For reference let's note that thickness of a human hair is from 40 to 110 microns. Production process is a chain of complicated, filigree operations (assembly, pressing, drawing, rolling, outgassing, purification, etc.) requiring absolute accuracy, and compliance with technological requirements. The overall process from base materials to the final product lasts for about nine months. Needless to say, production process from the very beginning was monitored by the representatives of the International ITER Organization. Qualification tests of products were always a success, and their results were stable.

Vladimir Rozhdestvensky, Senior Vice-President on production of JSC "TVEL" commented fulfilment of engagements by the plant. He said - "We have completed a certain phase. It's a pity, this moment has come so early. Now we have to solve the issue on the demand for the built production line".

Director of the Project Center ITER, RF Domestic Agency Anatoly Krasilnikov stated: “Russian specialists have developed manufacturing plant that functions in compliance with the requirements and standards of the quality management, approved for construction of the nuclear facility in France. Great job was done to develop process lines and to introduce production standards. Our country can be proud with the results of this work”.

Project manager of the department for the production technological development of JSC “TVEL” Sergey Zernov added -: “mission is not completed, it is in progress. Our short-term objective is participation in modernization of Large Hadron Collider, in the perspective – it is development of FutureCircularCollider as part of the global CERN project”.

Currently superconductor production line of the Chepetsk Mechanical Plant is used for manufacture of wires for medical tomographic scanners, of wires for the new Russian accelerator (NIKA project), of titanium wires.