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and Manufacturing Engineering



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Cover story

In 1992 during the United Nations Conference on Environment and Development in Rio de Janeiro in Brazil, the Rio declaration on environment and development in Agenda 21 was proclaimed settling the rule of sustainable society and development in order to create the development ensuring the creation of more comfortable conditions of life. Engineering materials enabling manufacturing of applied products are produced from raw materials taken from natural environment. That activity is a part of civilisation system which is a fragment of ecosphere created by geo- and biosystems. The traditional development of materials was realised mainly exclusively in the framework of civilisation system ignoring the reactions with ecosphere. Only since relatively short time the necessity of reaction with the rest mentioned systems and together with it the idea of ecomaterials, taking into consideration a holistic approach towards ecosphere, not degrading

global environment and being smaller load for the planet during the production have been introduced as an important determination in design, manufacturing and exploitation of materials. That approach takes into consideration both the necessity of the development of new technologies connected with the developmental creativity and harmonic coexistence with ecosphere and the minimisation of the degradation of natural environment and also the optimisation of technology and infrastructure in order to ensure healthy life with the agreement of nature. Activities connected with that approach are included in three groups of issues connected with manufacturing of special materials ensuring the protection of natural environment, materials applied in systems ensuring smaller pollution emission and materials for strategic substitution of materials used so far but significantly threatening environment and causing its degradation. The conception of sustainable development is a reply for the disturbance of the ecological balance as a result of human activity including first of all the one connected with the application of a so far used model of unsustainable consumption and production and as a consequence of the development connected with that threats. The concept of sustainable development ensures essential balance between interests of contemporary and future generations and its aim is a man, not material goods. The lack of a theoretical model of scientific generalisations and an operational form of that conception is a fundamental reason for which so far the coherent methodology of sustainable development management has not been managed to be formulated and coefficients enabling unambiguous measurement have not been determined. Sustainable development in a global scale is then the sum of local occurrence and requires the seek of detailed structural and technological solutions. That is why the terms of sustainable technology or product or management appear. It is necessary to notice that the solution of the problems of sustainable development is not possible only in the field of technology but it is the field in which there are a lot of possibilities. The professional power engineering belongs to the biggest in the global scale emitters of gas and constant pollution to the atmosphere deciding about greenhouse effect, acid rains and ozone hole except automotive transport. Requirements of sustainable development also in that field cause the duties of constant care about the introduction of pre-ecological technology and cleaner production.

The increase of efficiency of thermal energetic blocks in the conventional power engineering by the increase of temperature and steam pressure, durability and availability of energetic equipment forced the search of special technologies of steel manufacturing assigned for temperature and pressure structural elements of boilers. One of the ways of modernisation of power engineering is then the introduction of boilers and turbines to overcritical parameters of steam at temperature of 650°C and in further perspective to 700°C and by significantly higher conditions of working pressure. It allows also for the solution of CO₂, SO₂ and NO_x emission reduction.

Nuclear power engineering does not load so strongly the environment as conventional one that is why in many countries a lot nuclear power plants were created which as it seems in the nearest decades in spite of ecologists' objections will become the fundamental source of energy because of exhaustion of conventional energetic resources including hard coal, oil and gas and relatively small energy resources from renewable sources, water energy, flow energy and other alternative resources including wind and sun energy. Failures of nuclear power plants are very dangerous and imagination must arise great radioactive cemeteries causing justified social anxiety. The alternative source of energy are wind power plants. 1MW-wind turbine situated in a place having an average wind intensification producing 2.3 million kWh of energy yearly being enough for 600 households and 40 MW wind farm can supply 40-50-thousand-citizen city. A few dozen thousands of people are supplied with electric energy by the biggest solar power plant called "Solar One" in the desert Mojave in California (USA). On the surface of 40 hectares on concentric districts there are 1818 mirrors controlled by a computer in the relation to the position of the Sun and concentrating solar light in a boiler placed centrally in the 78-meter tower. In many buildings e.g. in California (USA), Israel, Japan and the south of Europe and other countries the solar batteries are assembled completing energy supplied by professional power engineering. Spaceships and satellites, and also watches and calculators are supplied by solar energy. Of course, all mentioned devices require suitable materials and manufacturing technologies and also suitable research methods and diagnostics of consumption and damages of those devices and their elements. The significant part of the papers included in that Issue of the Journal AMME is sacrificed to those issues. The part of those works was included in the programme of the International Scientific Conference CAM'S in Gliwice-Zakopane, Poland on 27th-30th November 2006.

