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Sports Engineering

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Sports engineering is a branch of science and technology concerned with the purposeful creation and use of objects of industrial property in the field of physical education to improve the effectiveness of training and competition processes.

Sports engineering is still a very young branch of science. Engineering and engineering methods here refer to the whole range of methods for studying the movement of various sports apparatuses and the dynamics of many sports. These methods include both purely theoretical methods (mathematical and computer methods of motion analysis) and methods based on direct measurements of certain characteristics of an athlete or group of athletes. Sports equipment is all kinds of special equipment and implements that are necessary for a good sporting experience. Each sport requires its own set of sports equipment [2]. It is a term that summarises the use of various sports equipment, apparatus, devices, mechanical and electronic devices, the use of which is stipulated by the competition rules for particular sports. Most modern sports involve the use of sports equipment (ball, barbell, discus, javelin, kettlebell, mace, ribbon, uneven bars, beam, etc.) and/or special devices (skis, skates, helmet, stick, glasses, bicycle, parachute, ice axe, etc.) which are integral to the sport, contribute to achieving the highest achievements in a particular sport and/or ensure safety. There are several main groups of such items: - projectiles and equipment (apparatus); - sports uniforms (clothing and footwear); - competition equipment; -

equipment for the maintenance of sports facilities. At the same time, the structure in each group is even more diverse. For example, the equipment group includes both, basic sports equipment (clubs, rackets, balls, etc.) and training aids, training devices, etc. It is the quality of the equipment that determines how comfortable and safe your sporting activities will be. The quality of equipment also has a huge impact on an athlete's performance level. Sports industry in the production of sports equipment widely uses the latest scientific and technological advances. Thanks to scientific and technological progress and its implementation in sports, it is possible that an athlete wins not because of his physical and intellectual abilities or capabilities, but because he has an equipment that his rivals do not have. Sports equipment is classified according to the sport for which it is used. But besides direct use in those or other sports, sports equipment may be used to equip sports halls, both general purpose and specialized (such as boxing rings, tennis courts, and others). Special sports equipment may also be designed for outdoor sports grounds or for swimming pools. This may be a variety of products as used for flooring, grounds, and can be all kinds of simulators and shells. Sports equipment may belong to different groups: for example, electric, power, magnetic and other kinds. What all these products have in common, however, is that they must be safe to use: they must not be toxic, many must be durable and not break or bend, i.e. they must be able to withstand considerable strain. Today, sport is at the edge of human capabilities [1]. Increasingly, progress depends on high-tech tools to train and diagnose athletes. In swimming, for example, we are talking about thousandths of a second, and experts are puzzling over how to make the start or turning technique as rational and efficient as possible. In javelin and hammer throwing it is important to understand clearly how the neuromuscular apparatus of the athlete and how intermuscular coordination is distributed. 30

years ago it took the coach hours to calculate each movement on a piece of paper, but now with video capture systems we have a 3D view of the athlete's movements online. Now we can easily evaluate by technical means not only the general physical preparedness, but also the physical, technical, tactical, technical-tactical and even moral-willful preparedness. Everything can be measured in numbers.

To improve the efficiency of technical training of athletes at the present stage of sports development, it is necessary to solve at least three problems. The first one is that there is no consensus among specialists on the meaning of some terms from the arsenal of concepts in the theory of physical education and sport, which, unfortunately, introduces serious and sometimes irreparable errors in the strategy of sports training in general. The second problem is that the theory and practice have not sufficiently investigated the most significant aspects of the development of rational samples of sports technique in various sports. The third problem is that the methodological support of the training process of highly skilled athletes in most sports focuses, as a rule, on increasing their functional capabilities. At the same time, there is a tangible lack of special scientific developments on the improvement of competitive technique and the process of technical training itself.

The scope of the specialist's professional activity:

- Organise and carry out the operation, repair and maintenance of the engineering and information systems of the sports facilities;
- Organisation and management of the activities of sports facilities;
- Manufacturing (design, construction, assembly, adjustment and testing of sports equipment);
- Sports (assembly and maintenance of sports equipment);

- Education (auxiliary support of the educational process in the laboratories of the departments of technical and physical education universities on special disciplines related to the technical support of sports; assisting in the training sessions);

- Science (study of operating processes and determination of characteristics of devices related to sports equipment, their units and mechanisms);

- Development of innovative technologies for training athletes with the use of new technical means, contributing to the achievement of high sports results).

In conclusion, we would like to note that until recently Belarus could not boast of such technical provision of facilities with technical means. The development of the material and technical basis of the physical culture and sports industry in recent years has required the involvement of qualified engineering staff, proficient in the design, creation and operation of technical facilities used in modern sports. The globalisation of the world economy enables us to use advanced foreign technological components to develop and produce our own innovative sports equipment and implements using our main reserve - our scientific potential. Thus, the development of innovative engineering technologies will be accompanied and increasingly influenced by sports. There is an urgent need to address the use of "technological doping" in sport and to exploit the new possibilities of sports engineering for the development of sport.

References:

1. Human capabilities in sports [Electronic resource]. – Mode of access: <https://researchgate.net> – Date of access: 29.03.2021.
2. Sports equipment [Electronic resource]. – Mode of access: <https://en.m.wikipedia.org/wiki>. – Date of access: 23.03.2021.