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Sports Technology in Engineering Curriculum – A View

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Abstract – Technology has exaggerated equipment design from low level recreational activities to high level competitive sports in the world scenario. The industry is steadily embracing new technology and adapting its products to keep up with the changing global trends so as to become the most important centre for sport goods manufacturing in the world. Sports engineering is concerned with the research and development of technologies for the sports industry. Sports engineers can be involved with projects as diverse as designing to provide with an in-depth understanding of scientific and engineering disciplines related to the holistic context of modern sports technology, such as mechanical, materials, manufacturing, electrical, chemical, biomedical, construction engineering, sports science, business, textile technology, and mathematics. AICTE the regulator body for technical education in India has 3,364 engineering colleges across the country with about 740 courses under various streams, graduating over 39, 61, 000 students during the year 2015-16. When the plenty of courses are running, then why not a course or a stream viz, "Sports Technology" this may be introduced in engineering curriculum system. The technical advancement and broad capabilities in the field of sports shall enhance employability prospects too in India. In this paper an effort has been made to draw the attention of the concerned to implement the sports technology program in Indian system of engineering curriculum.

Keywords: Sports Technology, Engineering Curriculum, Trained Professionals, Optimized Manufacturing Techniques.

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1. INTRODUCTION

Sports is a major global activity that spread across all geographical borders imparting people of all continents, of all race and cultures. Sports engineering is concerned with the research and development of technologies for the sports industry. Technology, in various forms, has been utilized in sports for many years and played a particularly vital role in elite sports. The global sports industry is growing faster than the overall domestic product while the global market growth for sports equipment is more than twice that of the global economy. Investment in research and innovation, design and manufacturing of sports products is significant. Owing to its focus on the development and manufacture of optimal sports equipment using the latest technologies and a scientific approach, the sports technology program gives sports a whole new dimension and set standards for future technology in India. The comprehensive undergraduate course shall covers technical, scientific and operational aspects.

Over the past decade, many new undergraduate courses in engineering and technology have emerged in AICTE prospectuses in the country. Sports engineering is need to be established as academic field for the growing sports equipment industry that is to be driven by technical performance. Graduate/post-graduate courses in sports engineering differ widely in the quality and scope. Some admirable courses are essentially a traditional engineering degree that has been modified to use sporting examples while other courses are more focused on product development and are allied to industrial design. The university foundation shall allow the students to combine professional qualifications with the flexibility required to meet the challenges of their future careers in sports technology.

Sports engineers can be involved with projects as diverse as designing to provide with an in-depth understanding of scientific and engineering disciplines related to the holistic context of modern sports technology, such as mechanical, materials, manufacturing, electrical, chemical, biomedical, construction engineering, sports science, business, textile technology, etc.

The field of sports engineering focuses on the development, testing, and design of sports equipment and sports-related technology. According to the International Sports Engineering Association, the field is a rapidly emergent subset of traditional engineering, exemplifying a wide range of academic study and technological development. In the United States, it is biomedical engineers, mechanical engineers, and biophysicists which are bridging the gap between sports and technology and classifying themselves as Sports Engineers.

The increase in technology will provide a convenient opportunity to athletes to be able to elevate their skill. Team games can have the ability to view and analyze videos of themselves in action, and can learn to improve technique and form. These technologies can assist athletes and coaches to view the plays and motions of the game. The same technology can be used to watch how the opponent team plays, too. By innovating and engineering new versions of these categories, the field of Sports Engineering is not only changing sporting goods, but also changing sports and the way athletes function. With the application of technical concepts and engineering expertise, the field of Sports Engineering is helping to engineer sports safety, sports health, and even sports performance.

The curriculum is needed to be provided an insight into the importance of basic sciences, biomechanics, movement sciences, training research, and sports medicine. This requires a high motivation to face new scientific evidences, actual research projects and the necessary theoretical-methodological approaches. Hence, a branch Sports Technology is required to be introduced in engineering curriculum system in India. This course will develop in combination with a number of leading sports organizations to meet their research and development needs. The sports industry shall be driven by innovation and it will provide the ideal springboard to gain employment in this dynamic area. The lack of Sports Engineers is one of the major impediments in the process of development of sports Technology in India. The objective of this article is to analyze the present state of sports Technology in engineering colleges of the country and propose a possible road map for its development.

2. OBJECTIVES OF THE CURRICULUM:

- To utilize indigenous resources from all possible realms to revolutionize Indian sports industries.
- To make Indian sports industry professional and self-reliant.
- To make India global destination for sports Engineering.
- To provide with the knowledge and skills relevant to a career as a professional engineer who can work effectively with current and future engineering product design, development and production / implementation methods.
- To study the cutting edge of sports engineering and learn how to apply advanced engineering techniques to the research and development of sports technologies.
- To provide required energy efficient, co-located and shared science and engineering teaching laboratories, incorporating engineering design and workshop facilities for students.
- To continue to provide skilled, highly employable graduates into the Indian vital industries.

3. (A) SPORTS GOODS INDUSTRY IN INDIA:

The center of sports industry in India is in and around Jalandhar in the state of Punjab and Meerut in the state of Uttar Pradesh account for nearly 75 per cent of total production. Together, the two towns house more than 3,000 manufacturing units and 130 exporters. Cricket equipment has the largest share (around 70 per cent) among goods manufactured for the domestic market. High-end footwear and technology-intensive equipment are imported. At present, India is importing products like, gymnastics and athletic equipment, golf clubs and specialized sports shoes from countries like China, USA, Taiwan and Italy as these products does not have modern sports technology in manufacturing sector of India. Table - 1 provide the details of export and import of products made by Sportech firm during the years 2007-08 and 2012-13.

Table – 1: Products exported and imported by Sportech Industry, India (All Values are in Rs. Crores)

Market Size of Sports Tech Products							
Sl No	Particulars	Year 2007 – 08				Year 2012 – 13	
		Production	Imports	Exports	Domestic Consumption	Domestic Consumption	Exports Potential
1	Sport Composites	455	13	175	293	410	352
2	Artificial Turf	0	26	0	26	52	0
3	Parachute Fabric	7.4	0.35	1.5	6.25	7.25	1.7
4	Hot Air Balloon	0.11	0.07	0	0.18	0.25	0
5	Sleeping Bags	27	3	18	12	20	20
6	Sports Nets	18	0	13	5	6.7	17.4
7	Sports Footwear Components	2230	20	0	2250	3810	0
8	Sail Cloth	0	0	0	<1 Lakh	<1 Lakh	0
9	High Performance Swimwear	0	0.84	0	0.84	1.08	12
10	Tents	47	3	11	39	49.8	0
TOTAL (All Values are in Rs. Crores)		2785	67	219	2632	43584	403

(B) ANALYSIS OF INDIAN SPORT GOODS INDUSTRY:

It has been observed that with global integration, the culture of the workplace in India is changing. Indian sports good sector is a fast growing and revenue generating sector. Technology has become a more pronounced changing force in the industry. Sporting equipment is been developed with technology features attached, like MP3/ipod sports shoes, the 'iGallop' and mini stepper. Sports gears are increasingly designed with the help of the latest sports science, with the application of new materials to enhance performance. There is a vital need for a branch in engineering institutions as Sports Technology, as this will meets the challenges of the advancement of technology available in the world scenario.

4. (A) COURSE FEATURE:

Sports technology course shall be introduced in the universities and engineering colleges, with broad based that covered Sports Science, Design, Technology, and Engineering Science. Major themes focus on sports equipment and facilities, the design of sports equipment, the use of materials in equipment design, methods of manufacture, the role of computer aided design, biomechanics, sports physiology, evaluation and testing of sports equipment and business studies for the sports industry.

(B) LABORATORY:

a) Cutting edge facilities and student focused laboratories is required to be created an incredible learning environment with regards to the latest technology that being used in developed countries.

b) Provide required energy efficient, co-located and shared science and engineering teaching laboratories, incorporating engineering design and workshop facilities for students.

5. APPLICATION OF SPORTS ENGINEERING:

The field of Sports Engineering focuses on innovating sport technologies which can be divided into three main groups:

a) Sports Soft Goods (Wearable technology) – shoes, uniforms, base layers, shirts, pants, shorts.

b) Sports Gear – helmets, pads, skates, braces, gloves.

c) Sports Equipment – Fitness Equipment, Athletic Equipment, Gymnastics apparatus, playing surfaces, and balls.

A focus may be made on the specialization subjects like, the application of composite fiber materials in sports equipments, as more stringent requirements, the fiber reinforced composite material applied to the sporting goods to the mainstream in the development of sports goods industry in the 21st century. Composites forming technologies development greatly enhance the design degrees of freedom than traditional materials all kind of products can always find the corresponding. Use of nanotechnology in manufacturing sporting equipment is emerging technology in sports industry. Aerodynamic of Sports Equipments**,** is well recognized in basic aerodynamics principles to the javelin throw, baseball, golf, tennis, cricket, volleyball and soccer. In most of these sports, the deflection is produced by spinning the ball about an axis perpendicular to the line of flight which generates the Magnus effect. (The Magnus effect uses Bernoulli's principle. Bernoulli's equation states that if the velocity of a moving fluid increased, the pressure must decrease).

It has long been known that the aerodynamics of sport balls are strongly dependent on the detailed development and behavior of the boundary layer on the ball's surface. A side force, which makes a ball swing through the air, can also be generated in the absence of the Magnus effect. This will be adopted in sports technology studies. Computer aided design (CAD) has played a significant role, software makes designing the likes of golf clubs, hockey sticks and other athletic equipment faster and much more efficient. CAD design software allows for the creation of products in a 3D virtual environment. Also, CAD files can be transferred and input into analysis and manufacturing software to streamline product development. They can also be uploaded into rapid prototyping machines such as 3D printers to create test parts.

In Tennis, there are now rackets with sensors that can display a whole host of interesting data to the computer based device. We can receive information such as shot power, exactly where the player is hitting the ball and how much spin is placed on the ball. Top players around the world are picking up this kind of exciting new development Tennis rackets.

6. CONCLUSIONS:

India is a one of the major sporting country of the World. But, the sports industry is not yet developed in India. We have a great prospect in sport industry due to various factors like sports loving people, highly educated workforce, and availability of basic

infrastructures like electricity and raw materials and scope of manufacturing sports Equipments. If Indian government implement Sports Technology programme in engineering colleges and also allocate funds for sports industry like IT sector, we can also compete with USA and UK in a big way.

In recent years, the developed countries use their advantages in the field of materials and engineering technology, the application in the field of composite materials in the sporting goods expands unceasingly, has made remarkable achievements. The dream 'Make in India' launched by the honourable Prime Minister is enabling growth, investment and tools to promote integration with global manufacturing and supply chain. New sports initiatives require professional human capital to speed up the growth, but in India, availability of professional sports engineers and managers are less or minimal. AICTE the regulator body for technical education in India has 3,364 engineering colleges across the country with about 740 courses under various streams, graduating over 39, 61, 000 students during the year 2015-16. Sports Technology may become a part of engineering stream in our country provided visionaries concerned thinks seriously in this direction.

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